

**ICSE 2025 EXAMINATION**  
**Sample Question Paper – 1**  
**Computer Applications**

**Time: 2 Hours**

**Max. Marks: 100**

**General Instructions:**

1. Answers to this Paper must be written on the paper provided separately.
2. You will not be allowed to write during the first 15 minutes.
3. This time is to be spent in reading the question paper.
4. The time given at the head of this Paper is the time allowed for writing the answers.
5. This Paper is divided into two Sections.
6. Attempt all questions from Section A and any four questions from Section B.
7. The intended marks for questions or parts of questions are given in brackets [ ].

**SECTION A**

Attempt all questions from this part.

**QUESTION 1.**

**Choose the correct answer and write the correct option.**

(Do not copy the question, write the correct answers only.)

**(i) Which of the following is an incorrect way to declare an array?**

- |  |  |
|--|--|
| (a) <code>int arr[ ] = new int[6]</code> | (b) <code>int[ ]arr = new int[6]</code>  |
| (c) <code>int[ ]arr = new int[6]</code>  | (d) <code>int arr[ ] = int[6] new</code> |

**Answer:**

(d) `int arr[ ] = int[6] new`

**(ii) What will be the error in the following Java code?**

```
byte b = 50;  
b = b*50;
```

- (a) b cannot contain value 100, limited by its range.
- (b) Operator has converted b\*50 into int, which cannot be converted to byte without casting.

- (c) b cannot contain value 50.
- (d) No error in this code

**Answer:** (b) Operator has converted b\*50 into int, which cannot be converted to byte without casting.

**(iii) Array elements are always stored in \_\_\_\_ memory locations.**

- (a) Binary search
- (b) Random
- (c) Sequential and random
- (d) Sequential

**Answer:** (d) Sequential

**(iv) Determine the output of the following statement.**

```
String  
a[]={ "MI", "Samsung", "Micromax",  
        "One plus"};  
  
System.out.println(a[3].length);
```

- (a) 8
- (b) 7
- (c) 5
- (d) 9

**Answer:** (a) 8

**(v) Which operator is used to allocate memory for an array variable in Java?**

- (a) new
- (b) alloc
- (c) malloc
- (d) None of these

**Answer:** (a) new

**(vi) Which of the following is the superclass of the wrapper classes Double and Float?**

- (a) Number
- (b) Digits
- (c) Float
- (d) Long

**Answer:** (a) Number

**(vii) When does exceptions in Java arise in code sequence?**

- (a) Can occur any time
- (b) Compilation time
- (c) Run-time
- (d) None of the above

**Answer:** (a) Can occur any time

**(viii) What will be the output of the following code?**

```
String s = "7";  
int t = Integer.parseInt(s);  
t=t+1000;  
System.out.println(t);
```

- (a) 1009
- (b) 1000
- (c) 1011
- (d) 1007

**Answer:** (d) 1007

**(ix) What is a necessary condition for automatic type conversion in Java?**

- (a) The destination type can be larger or smaller than source type.
- (b) The destination type is larger than source type.
- (c) The destination type is smaller than source type.
- (d) None of the above

**Answer:** (a) The destination type can be larger or smaller than source type.

**(x) \_\_\_\_ means repetition of a set of statements, depending upon a condition test.**

- (a) Jump
- (b) Control
- (c) Iteration
- (d) Selection

**Answer:** (c) Iteration

**(xi) Can you declare an array without array size?**

- (a) Yes
- (b) No
- (c) Depend on array size
- (d) Depend on array elements

**Answer:** (b) No

**(xii) The get method is an example of which type of method?**

- (a) mutator method
- (b) accessors method
- (c) class method
- (d) static method

**Answer:** (b) accessors method

**(xiii) The class from which properties are inherited is called:**

- (a) sub class
- (b) derived class
- (c) child class
- (d) base class

**Answer:** (d) base class

**(xiv) Primitive types are passed through**

- (a) call by value
- (b) call by reference
- (c) Both (a) and (b)
- (d) None of these

**Answer:** (d) None of these

**(xv) A class can include fields and methods to represent the state and behavior of a/an \_\_\_\_.**

- (a) identifier
- (b) variable
- (c) token
- (d) object

**Answer:** (d) object

**(xvi) These data types are the data types defined by the language itself.**

- (a) Primitive
- (b) Non-primitive
- (c) Both (a) and (b)
- (d) None of the above

**Answer:** (b) Non-primitive

**(xvii) Assertion (A) :** Primitive data types are the data types defined by the language itself.

**Reason (R) :** Class interface and array are the examples of primitive data types.

- (a) Both Assertion (A) and Reason (R) are true and Reason (R) is a correct explanation of Assertion (A).
- (b) Both Assertion (A) and Reason (R) are true but Reason (R) is not a correct explanation of Assertion (A).
- (c) Assertion (A) is true and Reason (R) is false.
- (d) Assertion (A) is false and Reason (R) is true.

**Answer:** (c) Assertion (A) is true and Reason (R) is false.

**(xviii) Read the following text and choose the correct answer:**

Wrapper classes in Java allow primitive data types to be represented as objects.

When an object of a wrapper class is created, a data field is established where the value of a primitive data type can be stored.

**Wrapper class in Java is \_\_\_\_.**

- (a) Create a new instance of the class
- (b) Declare new classes called wrapper
- (c) Used to encapsulate primitive data types
- (d) None of the above

**Answer:** (a) Create a new instance of the class



**(xix) Assertion (A) :** Class is considered a primitive data type.

**Reason (R) :** A class is a user-defined data type, meaning it is created by the user.

- (a) Both Assertion (A) and Reason (R) are true and Reason (R) is a correct explanation of Assertion (A).
- (b) Both Assertion (A) and Reason (R) are true and Reason (R) is not a correct explanation of Assertion (A).
- (c) Assertion (A) is true and Reason (R) is false.
- (d) Assertion (A) is false and Reason (R) is true.

**Answer:** (d) Assertion (A) is false and Reason (R) is true.

**(xx) It is also referred to as a desktop or window-based application.**

- (a) Package
- (b) Java Applet
- (c) Servlet
- (d) Stand-alone application

**Answer:** (d) Stand-alone application

## QUESTION 2.

- (i) Observe the following class.

```
public class Myclass
{
    public static int
        a=4, b=5, c=6;
    public int x=2, y=3;
}
```

**Identify the variables for which each object of the class will have its own unique copy.**

**Answer:** x and y

- (ii) What will the following code output?

```
String s = new String
            ("Abhishek");
System.out.println(s.toUpperCase());
```

**Answer:**

Output

ABHISHEK

**(iii) What is the output of the following code ?**

```
double x = 3.7, y = 3.3;  
System.out.println(Math.min(Math.  
                                floor(x), y));  
System.out.println(Math.max(Math.  
                                ceil(x), y));
```

**Answer:**

Output

3.3

4.0

**(iv) Write the Java statement for the given mathematical expression:**

$$d = \frac{\sqrt{3x + x^2}}{a + b}$$

**Answer:** `double d=(Math.sqrt(3*x+x*x))/(a+b);`

**(v) Define the charAt() function.**

**Answer:** The charAt() function is a method in various programming languages, including Java and JavaScript, that is used to access a specific character within a string based on its index position. It takes an integer argument representing the index and returns the character at that position.

**(vi) State the number of bytes occupied by char and int data types.**

**Answer:** The number of bytes occupied by char and int data types typically depends on the system architecture and the compiler being used. However, the most common sizes are:

- char: 1 byte (8 bits)
- int: 4 bytes (32 bits) on most modern systems, though this can vary (e.g., on some 16-bit systems, int may be 2 bytes, and on some 64-bit systems, it can still be 4 bytes).

**(vii) What will be the output of following code snippet,**

```
int n = 300, a = 200;
if(a + n * 10 > 5000)
    System.out.println("100");
else
    System.out.println("200");
```

**Answer:**

Output

200

**(viii) State the values of num and chr :**

```
char ch = 'C';
int num = ch + 3;
char chr = (char) num;
```

**Answer:** The value of

num = 70

chr = F

**(ix) Write the output of the following code in Java.**

```
int x = 0;
while (x <= 3) {
    System.out.println(x);
    x = x + 1;
}
```

**Answer:**

Output

0

1

2

3

**(x) Rewrite the following code using while loop.**

```
int a= 100;
for(int b=2; b<=30; b=b+5)
{
    System.out.println("\n"+(b+a));
    a=a-2;
}
```

**Answer:**

```
int a = 100;
int b = 2;

while (b <= 30) {
    System.out.println("\n" + (b + a));
    a = a - 2;
    b = b + 5;
}
```

## **SECTION B**

Attempt any four questions from this section.

### **QUESTION 3.**

**A special number is defined as a number where the sum of the factorials of each digit equals the number itself.**

e.g.  $145 = 1! + 4! + 5! = 1 + 24 + 120$

Design a class Special to determine if a given number is a special number or not

**Answer:**



```

public class Special {
    public static boolean isSpecialNumber(int number) {
        int originalNumber = number;
        int sumFactorials = 0;

        while (number > 0) {
            int digit = number % 10;
            sumFactorials += factorial(digit);
            number /= 10;
        }

        return sumFactorials == originalNumber;
    }

    private static int factorial(int n) {
        if (n == 0) {
            return 1;
        } else {
            return n * factorial(n - 1);
        }
    }
}

public static void main(String[] args) {
    int number = 145;
    if (isSpecialNumber(number)) {
        System.out.println(number + " is a special number.");
    } else {
        System.out.println(number + " is not a special number.");
    }
}
}

```

#### QUESTION 4.

Write a Java program that prompts the user to enter the size and elements of an array. Then, ask the user to enter a number to insert and specify the index position where they want to insert the desired element in the array.

**Answer:**

```

import java.util.Scanner;

public class InsertElementInArray {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter the size of the array: ");
        int size = scanner.nextInt();

        int[] array = new int[size];

        System.out.println("Enter the elements of the array:");
        for (int i = 0; i < size; i++) {
            array[i] = scanner.nextInt();
        }

        System.out.print("Enter the number to insert: ");
        int numberToInsert = scanner.nextInt();

        System.out.print("Enter the index position to insert: ");
        int indexToInsert = scanner.nextInt();

```

```

// Check if the index is valid
if (indexToInsert < 0 || indexToInsert > size) {
    System.out.println("Invalid index position. Please enter a valid index within the array bounds.");
    return;
}

```

```

// Create a new array with one extra space
int[] newArray = new int[size + 1];

// Copy elements from the original array to the new array
for (int i = 0; i < indexToInsert; i++) {
    newArray[i] = array[i];
}

// Insert the new element at the specified index
newArray[indexToInsert] = numberToInsert;

```

```

// Copy the remaining elements from the original array to the
for (int i = indexToInsert; i < size; i++) {
    newArray[i + 1] = array[i];
}

```

new array

```

        System.out.println("Array after insertion:");
        for (int i = 0; i < size + 1; i++) {
            System.out.print(newArray[i] + " ");
        }
    }
}

```

#### QUESTION 5.

Write a menu-driven program using a switch statement.

(i) To print the Floyd's triangle

```

1
2 3
4 5 6
7 8 9 10
11 12 13 14 15

```

(ii) To print the Pascal triangle

```

1
1 1
1 2 1
1 3 3 1
1 4 6 4 1

```

**Answer:**

(i)

```

import java.io.*;
import java.util.*;

```

```

public class FloydsTriangle {
    public static void main(String[]
args) throws IOException {
        InputStreamReader IR = new
InputStreamReader(System.in);
        BufferedReader br = new
BufferedReader(IR);

```

```
        System.out.println("Choose  
the correct option:");
```

```
        System.out.println("1. To  
print Floyd's Triangle...");
```

```
        System.out.println("2. To  
print Pascal's Triangle...");
```

```
        int ch = Integer.parseInt(br.  
readLine());
```

```
        switch (ch) {
```

```
            case 1:
```

```
                printFloydsTriangle();
```

```
                break;
```

```
            case 2:
```

```
                printPascalsTriangle();
```

```
                break;
```

```
            default:
```

```
                System.out.println("Wrong  
choice");
```

```
        }
```

```
    }
```

```
        public static void  
printFloydsTriangle() {
```

```
            Scanner sc = new Scanner(System.  
in);
```

```
            System.out.println("How many  
rows do you want in this pattern?");
```

```
            int rows = sc.nextInt();
```

```
            int k = 1;
```

```
            System.out.println("Here is  
your pattern...!!!");
```

```
            for (int i = 1; i <= rows;  
i++) {
```

```
                for (int j = 1; j <= i;  
j++) {
```

```

        System.out.print(k +
" ");
        k++;
    }
    System.out.println();
}
sc.close();
}
}

```

(ii)

```

import java.util.Scanner;

public class PascalsTriangle {

    public static void
printPascalsTriangle() {
    Scanner sc = new Scanner(System.
in);

    System.out.println("How many
rows do you want in this pattern?");
    int rows = sc.nextInt();

    for (int i = 0; i < rows;
i++) {
        for (int j = rows; j >
i; j--) {
            System.out.print(" ");
        }

        int temp = 1;
        for (int k = 0; k <= i;
k++) {
            System.out.print(temp
+ " ");

            temp = temp * (i - k)
/ (k + 1);
        }
        System.out.println();
    }

    sc.close();
}
}

```



### QUESTION 6.

Write a Java program to print following patterns using switch case:

(i) 5 4 3 2 1

5 4 3 2

5 4 3

5 4

5

B B B B

C C C

D D

E

(ii) A A A A A

**Answer:**

```
import java.util.Scanner;

public class PatternPrinting {

    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter the pattern number (1 or 2): ");
        int patternNumber = scanner.nextInt();
        scanner.close();

        switch (patternNumber) {
            case 1:
                printPattern1();
                break;
            case 2:
                printPattern2();
                break;
            default:
                System.out.println("Invalid pattern number.");
        }
    }

    private static void printPattern1() {
        for (int i = 5; i >= 1; i--) {
            for (int j = i; j >= 1; j--) {
                System.out.print(j);
            }
            System.out.println();
        }
    }

    private static void printPattern2() {
        for (int i = 5; i >= 1; i--) {
            for (int j = 1; j <= i; j++) {
                System.out.print(j);
            }
            System.out.println();
        }
    }
}
```

```

private static void printPattern2() {
    char ch = 'A';
    for (int i = 5; i >= 1; i--) {
        for (int j = 1; j <= i; j++) {
            System.out.print(ch);
        }
        System.out.println();
        ch++;
    }
}
}

```

### QUESTION 7.

**Write a Java program which entered a string by user and count the occurrence of number of characters present in the string.**

e.g. Input String HELLO

Output

The character E has occurred for 1 time

The character H has occurred for 1 time

The character L has occurred for 2 times

The character O has occurred for 1 times

**Answer:**

```

import java.util.HashMap;
import java.util.Map;
import java.util.Scanner;

public class CharacterCount {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter a string: ");
        String inputString = scanner.nextLine();

        // Create a HashMap to store character frequencies
        Map<Character, Integer> charCountMap = new HashMap<>();

        // Iterate through each character in the string
        for (char ch : inputString.toCharArray()) {
            charCountMap.put(ch, charCountMap.getOrDefault(ch, 0) + 1);
        }
    }
}

```

```

// Print the character frequencies
for (Map.Entry<Character, Integer> entry
    System.out.println("The character " +
    }
    : charCountMap.entrySet()) {
+ entry.getKey() + " has occurred for " + entry.getValue() + " times");
    }
    scanner.close();
}
}

```

### QUESTION 8.

**Write a program to accept a string. Convert the string to uppercase. Count and output the number of double letter sequences that exist in the string.**

e.g. Input : Aarav will buy a ball and bat tomorrow

Output : 4

**Answer:**

```

import java.util.Scanner;

public class DoubleLetterCount {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter a string: ");
        String inputString = scanner.nextLine();

        // Convert the string to uppercase
        String uppercaseString = inputString.toUpperCase();

        // Initialize a counter to track double letter sequences
        int doubleLetterCount = 0;

        // Iterate through the characters of the string, comparing adjacent pairs
        for (int i = 0; i < uppercaseString.length() - 1; i++) {
            if (uppercaseString.charAt(i) == uppercaseString.charAt(i + 1)) {
                doubleLetterCount++;
            }
        }

        System.out.println("Number of double letter sequences: " + doubleLetterCount);
    }
}

```

**ICSE 2025 EXAMINATION**  
**Sample Question Paper – 2**  
**Computer Applications**

**Time: 2 Hours**

**Max. Marks: 100**

**General Instructions:**

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2. You will not be allowed to write during the first 15 minutes.
3. This time is to be spent in reading the question paper.
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5. This Paper is divided into two Sections.
6. Attempt all questions from Section A and any four questions from Section B.
7. The intended marks for questions or parts of questions are given in brackets [ ].

**SECTION A**

Attempt all questions from this part.

**QUESTION 1.**

**Choose the correct answer and write the correct option.**

(Do not copy the question, write the correct answers only.)

**(i) Identify the statement that involves a fall-through behavior:**

- |                |              |
|----------------|--------------|
| (a) Switch     | (b) For loop |
| (c) If-else-if | (d) If-else  |

**Answer:** (d) If-else

**(ii) This variable can be accessed by calling with the class name.**

- |              |                   |
|--------------|-------------------|
| (a) Instance | (b) Local         |
| (c) Class    | (d) None of these |

**Answer:** (c) Class

**(iii) Which of the following statements is true about logical errors?**

- (a) The compiler cannot detect these errors.
- (b) No error indication is shown when the program runs.
- (c) The program may yield correct results for some inputs but incorrect results for

others.

(d) All of the above

**Answer:** (d) All of the above

**(iv) Object-oriented programming primarily utilizes which of the following approaches?**

(a) Bottom-up approach

(b) Top down and bottom up approach

(c) Top down approach

(d) None of the above

**Answer:** (c) Top down approach

**(v) In which technique are the values of actual parameters copied to the formal parameters?**

(a) Call by reference

(b) Call by value

(c) Call by argument

(d) Call by method

**Answer:** (b) Call by value

**(vi) What is the main purpose of passing arguments to functions?**

(a) Message passing

(b) Parameter passing

(c) Variable passing

(d) Argument passing

**Answer:** (a) Message passing

**(vii) Which package would you import for the Scanner class?**

(a) java.util.\*;

(b) java.awt.\*;

(c) java.io.\*;

(d) java.lang.\*;

**Answer:** (a) java.util.\*;

**(viii) Give the output of Math.abs(x); when x = - 15.75**

(a) - 15.75

(b) 15.75

(c) 0.75

(d) None of these

**Answer:** (b) 15.75

**(ix) Which of the following is the correct way to declare an integer array with 10 elements?**

(a) int[ ] arr = new int[10];

(b) int arr;

(c) int arr (10);

(d) int ( ) arr = new int (10);

**Answer:** (a) int[ ] arr = new int[10];



**(x) This access specifier is the most open access level.**

- |               |             |
|---------------|-------------|
| (a) Protected | (b) Public  |
| (c) Default   | (d) Private |

**Answer:** (b) Public

**(xi) A/An \_\_\_\_ is an abstract description of a set of objects.**

- |                  |                   |
|------------------|-------------------|
| (a) Class        | (b) Encapsulation |
| (c) Polymorphism | (d) Abstraction   |

**Answer:** (a) Class

**(xii) What is the corresponding wrapper class for the float data type?**

- |           |              |
|-----------|--------------|
| (a) FLOAT | (b) Float    |
| (c) Float | (d) Floating |

**Answer:** (c) Float

**(xiii) What will be the output of the following code snippet?**

```
int size = 2;
if (size < 0)
    System.out.println("Small");
else if (size == 0)
    System.out.println("Medium");
else
    System.out.println("Large");
```

- |            |                   |
|------------|-------------------|
| (a) Small  | (b) Large         |
| (c) Medium | (d) Runtime error |

**Answer:** (b) Large

**(xiv) What will be the output of the following code snippet?**

```
System.out.println("Bangalore".substring(1, 5));
```

(a) Bangalore	(b) Bang
(c) Anga	(d) Lore

**Answer:** (c) Anga

**(xv) If int arr[ ] = {2, 4, 6, 8, 10}; what is the value of arr.length?**

- |       |                          |
|-------|--------------------------|
| (a) 5 | (b) 4                    |
| (c) 6 | (d) Cannot be determined |

**Answer:** (a) 5

**(xvi) A binary search**

- (a) Can be used with sorted arrays only.
- (b) Can be used with unsorted arrays only.
- (c) Can be used with both sorted and unsorted arrays.
- (d) Cannot be used with arrays.

**Answer:** (a) Can be used with sorted arrays only.

**(xvii) Assertion (A) :** Array is a data type which can store multiple homogenous variables.

**Reason (R) :** Elements of array are stored in an indexed manner starting with index 0.

- (a) Both Assertion (A) and Reason (R) are true and Reason (R) is a correct explanation of Assertion (A).
- (b) Both Assertion (A) and Reason (R) are true and Reason (R) is not a correct explanation of Assertion (A).
- (c) Assertion (A) is true and Reason (R) is false.
- (d) Assertion (A) is false and Reason (R) is true.

**Answer:** (b) Both Assertion (A) and Reason (R) are true and Reason (R) is not a correct explanation of Assertion (A).

**(xviii) Read the following text and choose the correct answer:**

The public access specifier enables a class to make its member variables and functions accessible to other functions and objects. With this specifier, any public member can be accessed from outside the class. Which access specifier is required for a class to ensure it can be inherited by a subclass?

- (a) Public
- (b) Private
- (c) Protected
- (d) None of the mentioned

**Answer:** (a) Public

**(xix) Assertion (A) :** Method should be called explicitly either with object reference or class reference.

**Reason (R) :** Method can be any user defined name.

- (a) Both Assertion (A) and Reason (R) are true and Reason (R) is a correct explanation of Assertion (A).
- (b) Both Assertion (A) and Reason (R) are true and Reason (R) is not a correct explanation of Assertion (A).
- (c) Assertion (A) is true and Reason (R) is false.
- (d) Assertion (A) is false and Reason (R) is true.

**Answer:** (b) Both Assertion (A) and Reason (R) are true and Reason (R) is not a correct explanation of Assertion (A).

**(xx) Which method is used to check if a specified char value is uppercase?**

- |                       |                       |
|-----------------------|-----------------------|
| (a) toUpperCase(char) | (b) toLowerCase(char) |
| (c) isLowerCase(char) | (d) isUpperCase(char) |

**Answer:** (d) isUpperCase(char)

## QUESTION 2.

**(i) Write the values that will be assigned to x,y and t after executing the following code.**

```
public class StringManipulation {  
    public static void main(String[] args) {  
        String s1, s2, x, y;  
        int t;  
  
        s1 = "computer";  
        s2 = "science";  
  
        x = s1.substring(3, 6);  
        y = s2.concat(s1);  
  
        t = y.length();  
  
        System.out.println("x=" + x);  
        System.out.println("y=" + y);  
        System.out.println("t=" + t);  
    }  
}
```

**Answer:**

Output

x=put

y=sciencecomputer

t=15

**(ii) The following code has some error(s). Rewrite the correct code and underlining all the corrections made.**

```

int counter=0;
integer i=15; num;
for(num=i; num>=1; num-- -)
{
    If i%num=0
    {
        counter=counter+1;
    }
}

```

**Answer:**

```

int counter    ;
int i = 15; // _integer_ changed to _int
for (int num = i; num >= 1; num--) // Added _int_ before num, fixed _- -_
{
    if (i % num == 0) // Fixed _i%num_ to _i % num_ for readability
    {
        counter = counter + 1;
    }
}

```

**(iii) Rewrite the following program segment using while instead of for loop.**

```

int f=1, i;
for(i=1; i<=5; i++)
{
    f *=i;
    System.out.println(f);
}

```

**Answer:**

```

int f = 1, i = 1;
while (i <= 5)
{
    f *= i;
    System.out.println(f);
    i++;
}

```

**(iv) Write the values of c and d after execution of following code.**

```
int a = 3;  
int b = 4;  
int c;  
int d;  
c = ++b;  
d = a++;  
c++;
```

**Answer:**

value of c is 6.

value of d is 3.

**(v) Write the values that will be stored in variables num and sum after executing of following code.**

```
int sum = 5;  
int num = -3;  
  
do {  
    sum = sum + num;  
    num++;  
} while (num < 2);
```

**Answer:**

value of num = 0

value of sum = 2

**(vi) Predict the output of the following.**

(a) Math. pow(3.5, 3) + Math. ceil (4.2)

(b) Math. round (3.6) + Math. log (10)

**Answer:**

(a) 47.875

(b) 6.302

**(vii) Observe the following code and write how many times will be the loop execute?**



```

a = 8;
b = 6;
while (b != 0) {
    r = a % b;
    a = b;
    b = r;
}
System.out.println(" " + a);

```

**Answer:** The loop will be executed 2times.

**(viii) Write the Java statement for the following mathematical expression :**

$$a = \frac{0.02 - 3y^3}{x + y}$$

**Answer:**

```

a = (0.02 - 3 * Math.pow(y, 3)) / (x + y);

```

**(ix) Give the output of the following expression, when a=6.**

```

a += ++ +a +a++ +a-- +a-- + --a + ++a

```

**Answer:**

```

a += ++a + a++ + a-- + a-- + --a + ++a [a = 6]
a = a + (++a + a++ + a-- + a-- + --a + ++a) [a = 6]
a = 6 + (7 + 7 + a++ + a-- + a-- + --a + ++a) [a = 7]
a = 6 + (7 + 7 + a-- + a-- + --a + ++a) [a = 8]
a = 6 + (7 + 7 + 8 + a-- + --a + ++a) [a = 7]
a = 6 + (7 + 7 + 8 + 7 + --a + ++a) [a = 6]
a = 6 + (7 + 7 + 8 + 7 + 5 + ++a) [a = 5]
a = 6 + (7 + 7 + 8 + 7 + 5 + 6) [a = 6]
a = 6 + 40
a = 46

```

**(x) State the method that**

(a) converts a string to a primitive float data type.

(b) determines if the specified character is an uppercase character.

**Answer:**

- (a) `Float.parseFloat()`
- (b) `Character.toUpperCase()`

## **SECTION B**

Attempt any four questions from this section.

### **QUESTION 3.**

**Write a program in Java which prints Fibonacci series using arrays.**

**Answer:**

```
import java.util.*;

public class Fibonacci {
    static int fib(int n) {
        int f[] = new int[n + 2];
        f[0] = 0;
        f[1] = 1;
        for (int i = 2; i <= n; i++) {
            f[i] = f[i - 1] + f[i - 2];
        }
        return f[n];
    }
    public static void main(String
args[]) {
        int N = 10;
        for (int i = 0; i < N; i++) {
            System.out.print(fib(i) + " ");
        }
    }
}
```

### **QUESTION 4.**

**Rahul Transport Company charges customers for parcel deliveries based on the following specifications:**

<b>Class name</b>	<b>Atransport</b>
<b>Member variables</b>	
String name	to store the name of the customer
int w	to store the weight of the parcel in Kg
int charge	to store the charge of the parcel
<b>Member functions</b>	
void accept ()	to accept the name of the customer, weight of the parcel from the user (using Scanner class)
void calculate ()	To calculate the charge as per the weight of the parcel as per the following criteria
<b>Weight in Kg    Charge per Kg</b>	
Upto 10 Kgs    Rs. 25 per Kg	
Next 20 Kgs    Rs. 20 per Kg	
Above 30 Kgs    Rs. 10 per Kg	
A surcharge of 5% is charged on the bill.	
void print()	to print the name of the customer, weight of the parcel, total bill inclusive of surcharge in a tabular form in the following format: Name    Weight    Bill amount -----

Define a class with the above-mentioned specifications, create the main method, create an object and invoke the member methods.

**Answer:**

```
import java.util.Scanner;

class Atransport {
    String name;
    int w, charge;

    void accept() {
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter the name of the customer: ");
        name = sc.nextLine();
        System.out.print("Enter the weight of the parcel in Kg: ");
        w = sc.nextInt();
    }
}
```

```

void calculate() {
    if (w <= 10) {
        charge = w * 25;
    } else if (w <= 30) {
        charge = 250 + (w - 10) * 20;
    } else {
        charge = 550 + (w - 30) * 10;
    }

    // Add 5% surcharge
    charge += charge * 0.05;
}

void print() {
    System.out.println("Name\tWeight\tBill amount");
    System.out.println(name + "\t" + w + "\t" + charge);
}

public static void main(String[] args) {
    Atransport obj = new Atransport();
    obj.accept();
    obj.calculate();
    obj.print();
}
}

```

#### QUESTION 5.

Use a switch statement to draw the following patterns:

(i) A B C D E D C B A  
 A B C D C B A  
 A B C B A  
 A B A  
 A

(ii) 1  
 2 1  
 3 2 1  
 4 3 2 1  
 5 4 3 2 1

**Answer:**

```
import java.util.Scanner;

public class PatternSwitch {

    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter the pattern number (1 or 2): ");
        int pattern = sc.nextInt();

        switch (pattern) {
            case 1:
                drawPattern1();
                break;
            case 2:
                drawPattern2();
                break;
            default:
                System.out.println("Invalid pattern number.");
        }

        sc.close();
    }
}
```

```
private static void drawPattern1() {
    System.out.println("Pattern 1:");
    for (int i = 1; i <= 5; i++) {
        for (int j = 1; j <= 9 - 2 * i; j++) {
            System.out.print(" ");
        }
        for (int j = i; j >= 1; j--) {
            System.out.print((char) ('A' + j - 1));
        }
        for (int j = 2; j <= i; j++) {
            System.out.print((char) ('A' + j - 1));
        }
        System.out.println();
    }
}
```



```

private static void drawPattern2() {
    System.out.println("Pattern 2:");
    for (int i = 1; i <= 5; i++) {
        for (int j = 1; j <= i; j++) {
            System.out.print(j);
        }
        System.out.println();
    }
}
}

```

### QUESTION 6.

Using the switch statement, write a menu driven program for the following :

(i)

```

1
1 2
1 2 3
1 2 3 4
1 2 3 4 5

```

(ii)

```

B
B L
B L U
B L U E

```

### Answer:

```

import java.util.Scanner;

public class MenuDrivenProgram {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        int choice;

        do {
            System.out.println("Menu:");
            System.out.println("1. Print pattern (i)");
            System.out.println("2. Print pattern (ii)");
            System.out.println("3. Exit");
            System.out.print("Enter your choice: ");
            choice = scanner.nextInt();
        } while (choice != 3);
    }
}

```

```

        switch (choice) {
            case 1:
                printPattern1();
                break;
            case 2:
                printPattern2();
                break;
            case 3:
                System.out.println("Exiting program.");
                break;
            default:
                System.out.println("Invalid choice. Please try again.");
        }

    } while (choice != 3);

    scanner.close();
}

public static void printPattern1() {
    for (int i = 1; i <= 5; i++) {
        for (int j = 1; j <= i; j++) {
            System.out.print(j + " ");
        }
        System.out.println();
    }
}

public static void printPattern2() {
    String word = "BLUE";
    for (int i = 0; i < word.length(); i++) {
        for (int j = 0; j <= i; j++) {
            System.out.print(word.charAt(j) + " ");
        }
        System.out.println();
    }
}
}
}

```

#### QUESTION 7.

A showroom offers the following discounts based on the total cost of items purchased:

Total Cost	Discount	Item
Less than or up to Rs. 1000	3%	Teapot
Rs. 1001 to R s. 3000	5%	Dinner set
Rs. 3001 to Rs. 5000	10%	Plate

More than Rs. 5000	15%	Rack
--------------------	-----	------

Write a program to input the total cost of the item purchased, discount, amount to be paid after availing discount.

**Answer:**

```
import java.util.Scanner;

public class DiscountCalculator {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter the total cost of the item purchased: ");
        double totalCost = scanner.nextDouble();

        double discount = 0;
        String item = "";

        if (totalCost <= 1000) {
            discount = 3;
            item = "Teapot";
        } else if (totalCost <= 3000) {
            discount = 5;
            item = "Dinner set";
        } else if (totalCost <= 5000) {
            discount = 10;
            item = "Plate";
        } else {
            discount = 15;
            item = "Rack";
        }

        double discountAmount = (totalCost * discount) / 100;
        double amountToPay = totalCost - discountAmount;

        System.out.println("Item Purchased: " + item);
        System.out.printf("Discount: %.2f%%\n", discount);
        System.out.printf("Discount Amount: Rs. %.2f\n", discountAmount);
        System.out.printf("Amount to Pay: Rs. %.2f\n", amountToPay);

        scanner.close();
    }
}
```

### QUESTION 8.

Write a Java program to display the pattern of the string entered by user. There are

two choices F and L. If user choose F, then first character of each word display. But if user choose L, then last character of each word display.

Sample Input HELLO WONDERS WORLD

Output	Choose F	Choose L
	H	O
	W	S
	W	D

**Answer:**

```
import java.util.Scanner;

public class DisplayPattern {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter a string: ");
        String inputString = scanner.nextLine();

        System.out.print("Choose F for first character or L for last character: ");
        char choice = scanner.next().charAt(0);

        scanner.close();

        String[] words = inputString.split("\\s+");

        System.out.println("Output:");

        if (choice == 'F') {
            for (String word : words) {
                System.out.println(word.charAt(0));
            }
        } else if (choice == 'L') {
            for (String word : words) {
                System.out.println(word.charAt(word.length() - 1));
            }
        } else {
            System.out.println("Invalid choice. Please choose F or L.");
        }
    }
}
```

**ICSE 2025 EXAMINATION**  
**Sample Question Paper – 3**  
**Computer Applications**

**Time: 2 Hours**

**Max. Marks: 100**

**General Instructions:**

1. Answers to this Paper must be written on the paper provided separately.
2. You will not be allowed to write during the first 15 minutes.
3. This time is to be spent in reading the question paper.
4. The time given at the head of this Paper is the time allowed for writing the answers.
5. This Paper is divided into two Sections.
6. Attempt all questions from Section A and any four questions from Section B.
7. The intended marks for questions or parts of questions are given in brackets [ ].

**SECTION A**

Attempt all questions from this part.

**QUESTION 1.**

**Choose the correct answer and write the correct option.**

(Do not copy the question, write the correct answers only.)

(i) What will this code produce as output ?

```
int a[] = {2, 4, 6, 8, 10};  
a[0] = 23;  
a[3] = a[1];  
int c = a[0] + a[1];  
System.out.println("Sum = " + c);
```

- |        |        |
|--------|--------|
| (a) 26 | (b) 23 |
| (c) 25 | (d) 27 |

**Answer:** (d) 27

**(ii) The process of binding the data and method together as one unit is called as**

- |                     |                   |
|---------------------|-------------------|
| (a) Dynamic binding | (b) Inheritance   |
| (c) Polymorphism    | (d) Encapsulation |

**Answer:** (b) Inheritance

**(iii) A collection of classes is known as a \_\_\_\_.**

- |             |                   |
|-------------|-------------------|
| (a) Package | (b) Function      |
| (c) Method  | (d) Wrapper class |

**Answer:** (a) Package

**(iv) What is the return type of the following function?**

is Letter Or Digit (char)

- |             |             |
|-------------|-------------|
| (a) String  | (b) Char    |
| (c) Integer | (d) Boolean |

**Answer:** (d) Boolean

**(v) What will the following code output?**

```
String str = "Computer Applications" + 1 + 0;  
System.out.println("Understanding " + str);
```

- (a) Understanding Computer Applications 10
- (b) Understanding Computer Application 20
- (c) Understanding Computer Application 10
- (d) Error

**Answer:** (a) Understanding Computer Applications 10

**(vi) What is the output of the following code.**

```
String s1 = "welcome";  
String s2 = "island";  
System.out.println(s1.substring(0).concat(s2.substring(2)));  
System.out.println(s2.toUpperCase());
```

- |                         |                                |
|-------------------------|--------------------------------|
| (a) Welcome-land ISLAND | (b) Welcome Land Island        |
| (c) WELCOME LAND        | (d) Welcome land ISLAND Island |

**Answer:** (a) Welcome-land ISLAND

**(vii) This term refers to the name assigned to a package, class, interface, method, or variable.**

- |             |                |
|-------------|----------------|
| (a) Keyword | (b) Token      |
| (c) Literal | (d) Identifier |

**Answer:** (d) Identifier

**(viii) These constructors require parameters to be provided when creating objects.**



- (a) Copy
- (b) Default
- (c) Parameterized
- (d) None of the above

**Answer:** (c) Parameterized

**(ix) int code[ ] = [25, 37, 38, 42];**

The given statement

- (a) assigns 37 to code [1]
- (b) assigns 25 to code [1]
- (c) assigns 38 to code [3]
- (d) assigns 42 to code [0]

**Answer:** (a) assigns 37 to code [1]

**(x) The automatic conversion of a primitive data type into an object of its corresponding wrapper class is called:**

- (a) auto-boxing
- (b) explicit conversion
- (c) shifting
- (d) None of the above

**Answer:** (a) auto-boxing

**(xi) The parseInt ( ) function is a member of**

- (a) integer wrapper class
- (b) character wrapper class
- (c) boolean wrapper class
- (d) None of these

**Answer:** (a) integer wrapper class

**(xii) \_\_\_\_members are accessible inside their own class, classes within the package and subclasses.**

- (a) Private
- (b) Protected
- (c) Public
- (d) None of these

**Answer:** (b) Protected

**(xiii) Iteration is also known as**

- (a) looping
- (b) repetition
- (c) Both (a) and (b)
- (d) None of these

**Answer:** (c) Both (a) and (b)

**(xiv) \_\_\_\_are reference types, which hold the reference id of a memory location.**

- (a) Composite types
- (b) Primitive types
- (c) Attribute types
- (d) None of the above

**Answer:** (a) Composite types

**(xv) Classes that inherit from Runtime-exception are referred to as:**

- (a) Checked exceptions
- (b) Unchecked exceptions
- (c) Impure exceptions
- (d) Static exceptions

**Answer:** (b) Unchecked exceptions

**(xvi) Which of the following are invoked directly when an object is created?**

- (a) Methods
- (b) Arrays
- (c) Constructors
- (d) Strings

**Answer:** (c) Constructors

**(xvii) Assertion (A) :** Array is a data type which can store multiple homogenous variables.

**Reason (R) :** Elements of array are stored in an indexed manner starting with index 0.

- (a) Both Assertion (A) and Reason (R) are true and Reason (R) is a correct explanation of Assertion (A).
- (b) Both Assertion (A) and Reason (R) are true and Reason (R) is not a correct explanation of Assertion (A).
- (c) Assertion (A) is true and Reason (R) is false.
- (d) Assertion (A) is false and Reason (R) is true.

**Answer:** (b) Both Assertion (A) and Reason (R) are true and Reason (R) is not a correct explanation of Assertion (A).

**(xviii) Read the following text and choose the correct answer.**

Abstraction is a key concept in Object-Oriented Programming (OP) that focuses on representing essential features while omitting unnecessary background details or explanations..

**What is an abstraction?**

- (a) Abstraction is more about 'What' a class can do.
- (b) Abstraction is more about 'How' to achieve that functionality.
- (c) It binds data and methods in a single unit.
- (d) It implements using private access modifier.

**Answer:** (a) Abstraction is more about 'What' a class can do.

**(xix) Assertion (A) :** The factory of object means a factory that produces the objects.

**Reason (R) :** Class is known as object factory because single class generates a lot of objects.

- (a) Both Assertion (A) and Reason (R) are true and Reason (R) is a correct

explanation of Assertion (A).

(b) Both Assertion (A) and Reason (R) are true and Reason (R) is not a correct explanation of Assertion (A).

(c) Assertion (A) is true and Reason (R) is false.

(d) Assertion (A) is false and Reason (R) is true.

**Answer:** (a) Both Assertion (A) and Reason (R) are true and Reason (R) is a correct explanation of Assertion (A).

**(xx) Which of the following statement is incorrect?**

(a) Array can be initialized when they are declared.

(b) Array can be initialized using 'comma' separated expressions surrounded by curly braces.

(c) It is necessary to use 'new' operator to initialize an array.

(d) None of the above

**Answer:** (a) Array can be initialized when they are declared.

## QUESTION 2.

**(i) If `int a[] = {7, 3, 4, 8, 9, 2};` what are the values of x and y?**

(a) `x=a[1]*a[0]+a[3]`

(b) `y=a.length`

**Answer:**

```
(a) x = a[1]*a[0]+a[3]
    a[1] = 3, a[0] = 7, and a[3] = 8
    = 3*7+8
    = 21+8
    x = 29
```

```
(b) y = a.length
```

The length of array a is the total number of elements in it, which is 6.

So, `y = 6`.

**(ii) Determine the values of n and m after executing the following code:**

```
int m;
```

```
int n;
```

```
m=5;
```

```
n=(5*++m)%3;
```

```
System.out.println("n="+n+"m="+m);
```

**Answer:**

n=0

m=6

**(iii) Identify the keyword that:**

(a) Indicates an error has occurred during an input/output operation.

(b) Differentiates between an instance variable and a class variable.

**Answer:**

(a) Throws

(b) Static

**(iv) What will be the outcome of the following statements?**

int a=3;

System.out.println(" "+(1+a));

System.out.println(" "+1+a);

**Answer:**

Output

4

13

**(v) Name the primitive data type in Java that is a 64 bits integer and is used when you need a range of values under than those provided by int.**

**Answer:** long

**(vi) Give the prototype of a function search, which receives a sentence sentc and a word wrd and returns 1 or 0.**

**Answer:** int search (string sentc, String wrd)

**(vii) Determine the output of the following code.**

String str = "I Love My Family";

System.out.println(Integer.toStr  
ing(str.length()));

System.out.println(str.substring  
(12));

**Answer:**

Output

16

Family

(viii) Write a Java statement for the following mathematical expression :

$$V = \frac{1}{3} \pi r^2 h$$

**Answer:** `double V = (1.0/3) * Math.PI*r*r * h`

(ix) What will be the output of the following expressions?

(a) `Math.pow(3.4, 2)+2*Math. sqrt(64)`

(b) `Math.ceil(3.4)+2*Math. floor(3.4)+2`

**Answer:**

(a) 27.56

(b) 12.0

(x) How many times will the loop in the following code execute?

```
int x=2, y=50;
```

```
do
```

```
{
```

```
    ++x;
```

```
    y-- =x++;
```

```
}while (x<=10);
```

```
return y;
```

**Answer:** The loop will be executed 5 times.

## SECTION B

Attempt any four questions from this section.

### QUESTION 3.

Write a program to enter a number and check whether the number is Neon or not. A number is said to be Neon if sum of the digits of the square of the number is equal to the number itself.

e.g.Input : 9

Output :  $9*9 = 81$ ,  $8+1 = 9$

9 is Neon number.

**Answer:**

```

import java.util.Scanner;

public class NeonNumber {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter a number: ");
        int number = scanner.nextInt();

        int square = number * number;
        int sumOfDigits = 0;

        while (square > 0) {
            sumOfDigits += square % 10;
            square /= 10;
        }

        if (sumOfDigits == number) {
            System.out.println(number + " is a Neon number.");
        } else {
            System.out.println(number + " is not a Neon number.");
        }
    }
}

```

#### QUESTION 4.

Write a program to print following patterns.

(i) 1 2 3 4 5  
 1 2 3 4  
 1 2 3  
 1 2  
 1

(ii) A  
 B A  
 C B A  
 D C B A  
 E D C B A

**Answer:**

```

public class KboatPattern

    public static void main(String args[]) {
        System.out.println("Pattern 1: ");
        for (int i = 5; i >= 1; i--)
            for (int j = 1; j <= i; j++)
                System.out.print(j + " ");
    }
}

```



```

        System.out.println();
    }
    System.out.println();
    System.out.println("Pattern 2: " ,

    char ch = 'A';
    for (int i = 0; i < 5; i++)
        for (int j = i; j >= 0; j--)
            System.out.print((char)(65 + j) + " " ,

    System.out.println();
}

```

#### QUESTION 5.

Create a class The-string that takes a string input of up to 100 characters and counts the number of vowels, consonants, digits, and spaces in the provided sentence using if-else statements in Java.

**Answer:**

```

import java.util.Scanner;

public class The_string {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.println("Enter a string (up to 100 characters):");
        String input = scanner.nextLine();
        scanner.close();

        if (input.length() > 100) {
            System.out.println("Input exceeds 100 characters. Please try
again.");
            return;
        }

        int vowels = 0, consonants = 0, digits = 0, spaces = 0;
        input = input.toLowerCase();

        for (int i = 0; i < input.length(); i++) {
            char ch = input.charAt(i);

```

```

        if (ch >= 'a' && ch <= 'z') {
            if (ch == 'a' || ch == 'e' || ch == 'i' || ch == 'o' ||
ch == 'u') {
                vowels++;
            } else {
                consonants++;
            }
        } else if (ch >= '0' && ch <= '9') {
            digits++;
        } else if (ch == ' ') {
            spaces++;
        }
    }

    System.out.println("Vowels: " + vowels);
    System.out.println("Consonants: " + consonants);
    System.out.println("Digits: " + digits);
    System.out.println("Spaces: " + spaces);
}
}

```

#### QUESTION 6.

**Define a class StringMinMax to identify the smallest and the largest word present in the string.**

e.g. Input:       Hello this is wow world

Output:Smallest word: is Largest word: Hello

#### Answer:

```

public class StringMinMax {
    public static void main(String[] args) {
        String input = "Hello this is wow world";
        findMinMaxWords(input);
    }
}

```

```

public static void findMinMaxWords(String str) {
    String[] words = str.split(" ");
    String smallest = words[0];
    String largest = words[0];

    for (int i = 1; i < words.length; i++) {
        if (words[i].length() < smallest.length()) {
            smallest = words[i];
        }
        if (words[i].length() > largest.length()) {
            largest = words[i];
        }
    }

    System.out.println("Smallest word: " + smallest);
    System.out.println("Largest word: " + largest);
}
}

```

#### QUESTION 7.

**Define a class to accept values in integer array of size 10. Find sum of one digit number and sum of two digit numbers entered. Display them separately.**

Example : Input

a [ ] = {2, 12, 4, 9, 18, 25, 3, 32, 20, 1}

Output Sum of one digit numbers

$$2 + 4 + 9 + 3 + 1 = 19$$

Sum of two digit numbers

$$12 + 18 + 25 + 32 + 20 = 107$$

**Answer:**

```

import java.util.Scanner;

public class NumberSumCalculator {
    public static void main(String[] args) {
        int[] numbers = new int[10];
        Scanner scanner = new Scanner(System.in);

        // Input values
        System.out.println("Enter 10 integer values:");
        for (int i = 0; i < 10; i++) {
            numbers[i] = scanner.nextInt();
        }

        // Calculate sum
        int sumOneDigit = 0;
        int sumTwoDigit = 0;

        for (int num : numbers) {
            if (num >= 0 && num < 10) {
                sumOneDigit += num;
            } else if (num >= 10 && num < 100) {
                sumTwoDigit += num;
            }
        }

        // Display result
        System.out.println("Sum of one digit numbers: " + sumOneDigit);
        System.out.println("Sum of two digit numbers: " + sumTwoDigit);

        scanner.close();
    }
}

```

### QUESTION 8.

Write a program to input integer elements into an array of size 20 and perform the following operations :

- (i) Display largest number from the array.
- (ii) Display smallest number from the array.
- (iii) Display sum of all the elements of the array.

**Answer:**

```
import java.util.Scanner;

public class ArrayOperations {
    public static void main(String[] args) {
        int[] arr = new int[20];
        Scanner scanner = new Scanner(System.in);

        // Input array elements
        System.out.println("Enter 20 integer elements:");
        for (int i = 0; i < 20; i++) {
            arr[i] = scanner.nextInt();
        }

        // Find largest and smallest numbers
        int largest = arr[0];
        int smallest = arr[0];
        int sum = arr[0];

        for (int i = 1; i < arr.length; i++) {
            if (arr[i] > largest) {
                largest = arr[i];
            }
            if (arr[i] < smallest) {
                smallest = arr[i];
            }
            sum += arr[i];
        }

        // Display results
        System.out.println("Largest number: " + largest);
        System.out.println("Smallest number: " + smallest);
        System.out.println("Sum of all elements: " + sum);

        scanner.close();
    }
}
```

**ICSE 2025 EXAMINATION**  
**Sample Question Paper – 4**  
**Computer Applications**

**Time: 2 Hours**

**Max. Marks: 100**

**General Instructions:**

1. Answers to this Paper must be written on the paper provided separately.
2. You will not be allowed to write during the first 15 minutes.
3. This time is to be spent in reading the question paper.
4. The time given at the head of this Paper is the time allowed for writing the answers.
5. This Paper is divided into two Sections.
6. Attempt all questions from Section A and any four questions from Section B.
7. The intended marks for questions or parts of questions are given in brackets [ ].

**SECTION A**

Attempt all questions from this part.

**QUESTION 1.**

**Choose the correct answer and write the correct option.**

(Do not copy the question, write the correct answers only.)

**(i) A benefit of encapsulation is \_\_\_\_.**

- (a) The interface of the class will be smaller.
- (b) The implementation can be changed without altering programs that use the class.
- (c) The implementation of the class will be smaller.
- (d) The interface can be changed without modifying programs that use the class.

**Answer:** (b) The implementation can be changed without altering programs that use the class.

**(ii) Which of the following is a program or set of programs that converts source code into byte code?**

- (a) Java Source Code
- (b) Interpreter
- (c) Byte code
- (d) Java Compiler



**Answer:** (d) Java Compiler

**(iii) It is a composite data type because it requires to use its attributes.**

- |             |            |
|-------------|------------|
| (a) Array   | (b) Object |
| (c) Integer | (d) Class  |

**Answer:** (d) Class

**(iv) Which is not a true statement about array?**

- (a) An array expands automatically when it is full.
- (b) An array is allowed to contain duplicate values.
- (c) An array understands the concept of ordered elements.
- (d) An array uses a zero index to reference the first element.

**Answer:** (a) An array expands automatically when it is full.

**(v) Determine the output of the following functions.**

```
String x="Computer";  
String y="Applications";  
System.out.println(x.indexOf(x.  
                                charAt(4)));
```

- |       |       |
|-------|-------|
| (a) 4 | (b) 5 |
| (c) 3 | (d) 2 |

**Answer:** (a) 4

**(vi) What is the final value stored in variable x?**

```
double x = Math.ceil(Math.  
                    abs(- 7.3));
```

- |         |         |
|---------|---------|
| (a) 7.0 | (b) 8.0 |
| (c) 6.0 | (d) 9.0 |

**Answer:** (b) 8.0

**(vii) Determine the output of the following code segment.**

```
String myStr1 = "Hello";  
String myStr2 = "Hello";  
System.out.println(myStr1.  
                    compareTo(myStr2));
```

- |        |       |
|--------|-------|
| (a) 11 | (b) 2 |
| (c) 3  | (d) 0 |

**Answer:** (d) 0

**(viii) These statements can be used to modify the behavior of conditional and iterative statements.**

- |                          |                          |
|--------------------------|--------------------------|
| (a) Switch statements    | (b) Iterative statements |
| (c) Selection statements | (d) Jump statements      |

**Answer:** (d) Jump statements

**(ix) An array is a \_\_\_\_ data type.**

- |               |            |
|---------------|------------|
| (a) Integer   | (b) String |
| (c) Composite | (d) Mixed  |

**Answer:** (c) Composite

**(x) Which of the following methods can be used to join two strings?**

- |               |                    |
|---------------|--------------------|
| (a) Concat( ) | (b) Concatenate( ) |
| (c) Trim( )   | (d) Join( )        |

**Answer:** (a) Concat( )

**(xi) Which of the following concept can be used for encapsulation?**

- (a) Using interfaces
- (b) Hiding data and internal methods using access modifiers in a class
- (c) Wrapping data fields with methods
- (d) All of the above

**Answer:** (d) All of the above

**(xii) Variables that are shared by every instances of a class are \_\_\_\_.**

- |                        |                       |
|------------------------|-----------------------|
| (a) Public variables   | (b) Private variables |
| (c) Instance variables | (d) Class variables   |

**Answer:** (d) Class variables

**(xiii) In Java, a library of classes is called \_\_\_\_.**

- |                    |               |
|--------------------|---------------|
| (a) An application | (b) A package |
| (c) A directory    | (d) A folder  |

**Answer:** (d) A folder

**(xiv) How many types of print statements are there in Java?**

- |       |       |
|-------|-------|
| (a) 2 | (b) 3 |
| (c) 4 | (d) 5 |

**Answer:** (a) 2

**(xv) The order of the three top level elements of Java source file is**

- (a) Import, package, class
- (b) Class, import, package
- (c) Package, import, class
- (d) Any order

**Answer:** (c) Package, import, class

**(xvi) The keyword to create an object of a class is**

- (a) create
- (b) new
- (c) New
- (d) NEW

**Answer:** (c) New

**(xvii) Assertion (A) :** Pure functions define a relationship between input and output.

**Reason (R) :** A pure function does not depend on any state beyond its local scope.

- (a) Both Assertion (A) and Reason (R) are true and Reason (R) is a correct explanation of Assertion (A).
- (b) Both Assertion (A) and Reason (R) are true and Reason (R) is not a correct explanation of Assertion (A).
- (c) Assertion (A) is true and Reason (R) is false.
- (d) Assertion (A) is false and Reason (R) is true.

**Answer:** (a) Both Assertion (A) and Reason (R) are true and Reason (R) is a correct explanation of Assertion (A).

**(xviii) Read the following text and choose the correct answer:**

In java, a constructor is used to create an instance of a class. Constructors are similar to methods but differ in two ways: they have the same name as the class and no return type. Constructors are often called special methods, as they initialize an object when it's created.

**Which of the following is true about constructor?**

- (a) It can contain return type.
- (b) It can take any number of parameters.
- (c) It can have any non- access modifiers.
- (d) It cannot throw an exception.

**Answer:** (b) It can take any number of parameters.

**(xix) Assertion (A) :** static methods can only call static method within from them.

**Reason (R) :** static methods can refer this and super.

- (a) Both Assertion (A) and Reason (R) are true and Reason (R) is a correct explanation of Assertion (A).

(b) Both Assertion (A) and Reason (R) are true and Reason (R) is not a correct explanation of Assertion (A).

(c) Assertion (A) is true and Reason (R) is false.

(d) Assertion (A) is false and Reason (R) is true.

**Answer:** (c) Assertion (A) is true and Reason (R) is false.

**(xx) To declare a method in Java, choose the required components.**

(a) Modifier

(b) Return type

(c) Method name

(d) All of these

**Answer:** (d) All of these

## QUESTION 2.

**(i) Write down the two purposes of + operator in Java.**

**Answer:** In Java, the + operator serves two purposes:

1. **Arithmetic addition:** It adds numerical values (e.g.,  $5 + 3$  results in 8).
2. **String concatenation:** It joins two strings or a string with other data types (e.g., "Hello" + " World" results in "Hello World").

**(ii) Obtain the output of the following code in Java.**

```
int x=0;
while(x<=1)
{
    System.out.println("x\n");
    x=x+1;
}
```

**Answer:**

Output x  
x

**(iii) What happens, if we do not include break statement with a case in switch statement?**

**Answer:** If a **break** statement is not included in a **switch** case, execution will "fall through" to the next case, meaning the code in the following case(s) will also execute.

**(iv) What will be the value of variables m and n after the execution of the following code?**

```
int m, n=0;
for(m=1; m<=4; m++)
{
    n+ = m;
    n--;
}
```

**Answer:**

Value of m is 5.

Value of n is 5.

**(v) Write the corresponding Java expression for the following mathematical expression :**

$$z = x^3 + y^2 - \frac{\sqrt{xy}}{2}$$

**Answer:**

```
float z=x*x*x + y*y- (Math.sqrt (x*y) ) /2;
```

**(vi) Find the value of following statements :**

(a) Math.floor(1.9);

(b) Math.round(4.5);

**Answer:** (a) 1.0 (b) 5

**(vii) The following code has some error(s). Rewrite the correct code and underlining all the correction made :**

```
float m=6, float n=1, p=1;
do;
{
    p==p*n;
    n++;
while (n<=m);
System.out.print(" "+p);
}
```

**Answer:**

The correct code is

```
float m=6, n=1, p=1;  
do  
{  
    p=p*n;  
    n++;  
}  
while (n<=m) ;  
System.out.print(" "+p);
```

**(viii) What will be the output of following code?**

```
String s = "Madam";  
System.out.println(s.indexOf('d'));  
System.out.println(s.lastIndexOf  
                        ('m'));
```

**Answer:**

Output 2

4

**(ix) Given the following set of identifiers**

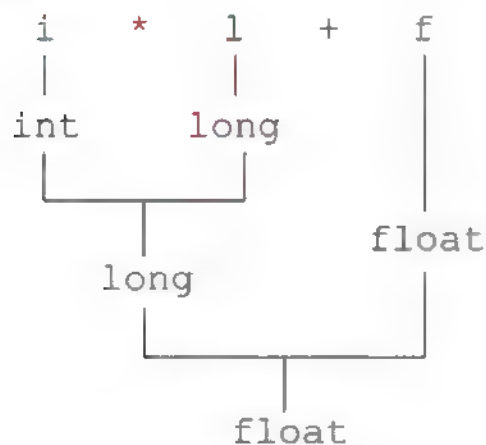
char c;      byte b;

int i;      short s;

long l;      float f;

Identify the data type of  $i * l + f$  expression.

**Answer:**



So, the data type of given expression is float.

**(x) Rewrite the following program code using if-else statement :**

```
int a = 2;
switch(a)
{
    case 0:
        GrandTotal=0.10*BillAmt;
        break;
    case 1:
        GrandTotal=0.9*BillAmt;
        break;
    case 2:
        GrandTotal=0.8*BillAmt;
        break;
    default:
        GrandTotal=BillAmt;
}
```

**Answer:**

```
int a = 2;

if (a == 0) {
    GrandTotal = 0.10 * BillAmt;
} else if (a == 1) {
    GrandTotal = 0.9 * BillAmt;
} else if (a == 2) {
    GrandTotal = 0.8 * BillAmt;
} else {
    GrandTotal = BillAmt;
}
```

## SECTION B

Attempt any four questions from this section.

### QUESTION 3.

**Write a Java program to enter a number and check whether entered number is Pronic number or not.**

Pronic number is the number which is the product of two consecutive integers.



e.g.  $110 = 10 * 11$

$56 = 7 * 8$

$12 = 3 * 4$

**Answer:**

```
import java.util.Scanner;

public class PronicNumber {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter a number: ");
        int num = scanner.nextInt();

        boolean isPronic = false;
        for (int i = 0; i <= Math.sqrt(num); i++) {
            if (i * (i + 1) == num) {
                isPronic = true;
                break;
            }
        }

        if (isPronic) {
            System.out.println(num + " is a pronic number");
        } else {
            System.out.println(num + " is not a pronic number");
        }
        scanner.close();
    }
}
```

#### QUESTION 4.

Design a class Perfect to check, if a given number is a perfect number or not. [A number is said to be perfect, if sum of the factors of the number excluding itself is equal to the original number]

For example  $6 = 1 + 2 + 3$ ; where 1, 2 and 3 are factors of 6, excluding itself.

**Answer:**

```

import java.util.Scanner;

public class Perfect {

    // Method to check if a number is perfect
    public static boolean isPerfectNumber(int number) {
        int sum = 0;

        // Loop through all possible divisors from 1 to number/2
        for (int i = 1; i <= number / 2; i++) {
            if (number % i == 0) { // Check if i is a divisor
                sum += i; // Add the divisor to the sum
            }
        }

        // A number is perfect if the sum of its divisors equals the
        number itself
        return sum == number;
    }

    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter a number to check if it is a perfect
number: ");
        int number = scanner.nextInt(); // Read user input

        // Check and display whether the number is perfect or not
        if (isPerfectNumber(number)) {
            System.out.println(number + " is a perfect number.");
        } else {
            System.out.println(number + " is not a perfect number.");
        }

        scanner.close(); // Close the scanner resource
    }
}

```

#### QUESTION 5.

Write a Java program to remove duplicate elements from an array.

**Answer:**

```

public class RemoveDuplicates {
    public static int[] removeDuplicates(int[] arr) {
        if (arr == null || arr.length <= 1) {
            return arr;
        }

        int uniqueCount = 1;
        for (int i = 1; i < arr.length; i++) {
            boolean isDuplicate = false;
            for (int j = 0; j < uniqueCount; j++) {
                if (arr[i] == arr[j]) {
                    isDuplicate = true;
                    break;
                }
            }
            if (!isDuplicate) {
                arr[uniqueCount] = arr[i];
                uniqueCount++;
            }
        }

        int[] result = new int[uniqueCount];
        System.arraycopy(arr, 0, result, 0, uniqueCount);
        return result;
    }

    public static void main(String[] args) {
        int[] originalArray = {1, 2, 3, 4, 2, 3, 5, 6, 1};
        System.out.println("Original array: " +
            java.util.Arrays.toString(originalArray));

        int[] uniqueArray = removeDuplicates(originalArray);
        System.out.println("Array with duplicates removed: " +
            java.util.Arrays.toString(uniqueArray));
    }
}

```

### QUESTION 6.

Write a program to print the following patterns.

(i) 1  
1 0  
1 0 1  
1 0 1 0  
1 0 1 0 1

(ii) A  
ABA  
ABCBA  
ABCD CBA  
ABCDEDCBA  
ABCDEFEDCBA

**Answer:**

### Pattern 1 - Number Pattern

```
public class Pattern1 {  
    public static void main(String[] args) {  
        int n = 5;  
        for(int i = 1; i <= n; i++) {  
            for(int j = 1; j <= i; j++) {  
                if(j % 2 == 1)  
                    System.out.print("1 ");  
                else  
                    System.out.print("0 ");  
            }  
            System.out.println();  
        }  
    }  
}
```

### Pattern 2 - Character Pattern

```
public class Pattern2 {  
    public static void main(String[] args) {  
        String str = "ABCDEF";  
        for(int i = 1; i <= 6; i++) {  
            // Print first half  
            for(int j = 0; j < i; j++) {  
                System.out.print(str.charAt(j));  
            }  
        }  
    }  
}
```

```

        // Print second half in reverse
        for(int j = i-2; j >= 0; j--) {
            System.out.print(str.charAt(j));
        }

        System.out.print("A");
        System.out.println();
    }
}

```

### QUESTION 7.

Write the code to print following patterns.

(i) 1  
 2 6  
 3 7 10  
 4 8 11 13  
 5 9 12 14 15

(ii) A A A A A  
 A A A B B  
 A A C C C  
 A D D D D  
 E E E E E

**Answer:**

#### Pattern 1

```

public class Pattern1 {
    public static void main(String[] args) {
        int n = 5; // Number of rows
        int num = 1; // Starting number

        for (int i = 1; i <= n; i++) {
            for (int j = 1; j <= i; j++) {
                System.out.print(num + " ");
                num++;
            }
            System.out.println();
        }
    }
}

```

#### Pattern 2

```

public class Pattern2 {
    public static void main(String[] args) {
        char ch = 'A'; // Starting character
        int n = 5; // Number of rows

        for (int i = 1; i <= n; i++) {
            for (int j = 1; j <= n - i + 1; j++) {
                System.out.print(ch + " ");
            }
            ch++;
            System.out.println();
        }
    }
}

```

#### QUESTION 8.

Write a Java program ask to the user to enter any five strings like names to sort them in alphabetical order, then display the sorted string in alphabetical order.

e.g. Input: Enter 5 Names/Words:

Nelam  
Payal  
Kanak  
Asha  
Darshita

Output: Now the List is :

Asha  
Darshita  
Kanak  
Nelam  
Payal

**Answer:**

```
import java.util.Arrays;
import java.util.Scanner;

public class SortStrings {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        String[] strings = new String[5];

        System.out.println("Enter 5 strings (names or words):");

        // Input strings from user
        for (int i = 0; i < 5; i++) {
            System.out.print("Enter string " + (i + 1) + ": ");
            strings[i] = scanner.nextLine();
        }

        // Sort the strings
        Arrays.sort(strings);

        // Display the sorted strings
        System.out.println("\nSorted strings in alphabetical order:");
        for (String s : strings) {
            System.out.println(s);
        }

        scanner.close();
    }
}
```



**ICSE 2025 EXAMINATION**  
**Sample Question Paper – 5**  
**Computer Applications**

**Time: 2 Hours**

**Max. Marks: 100**

**General Instructions:**

1. Answers to this Paper must be written on the paper provided separately.
2. You will not be allowed to write during the first 15 minutes.
3. This time is to be spent in reading the question paper.
4. The time given at the head of this Paper is the time allowed for writing the answers.
5. This Paper is divided into two Sections.
6. Attempt all questions from Section A and any four questions from Section B.
7. The intended marks for questions or parts of questions are given in brackets [ ].

**SECTION A**

Attempt all questions from this part.

**QUESTION 1.**

**Choose the correct answer and write the correct option.**

(Do not copy the question, write the correct answers only.)

**(i) Give the result produced by executing the following code."**

```
String str1 = "Information
                Technology";
String str2 = "information
                technology";

boolean p =
str1.equalsIgnoreCase(str2);
System.out.println("The result is
                    " p);
```

- |           |                   |
|-----------|-------------------|
| (a) True  | (b) False         |
| (c) Error | (d) Cannot define |

**Answer:** (a) True

**(ii) Which of the following is an advantage of using arrays in Java?**

- |                   |                         |
|-------------------|-------------------------|
| (a) Random access | (b) Code optimization   |
| (c) Both (a) and  | (b) (d) Size (no limit) |

**Answer:** (a) Random access

**(iii) Which of the following serves as the universal class for exception handling?**

- |                |            |
|----------------|------------|
| (a) Objects    | (b) Errors |
| (c) Exceptions | (d) Maths  |

**Answer:** (c) Exceptions

**(iv) What will be the output of the following Java program?**

```
class String_demo
{
    public static void main
                        (String args[])
    {
        int ascii[] = {65, 66, 67, 68};
        String s = new String(ascii, 1,3);
        System.out.println(s);
    }
}
```

- |         |          |
|---------|----------|
| (a) ABC | (b) BCD  |
| (c) CDA | (d) ABCD |

**Answer:** (b) BCD

**(v) What is the value returned by function compareTo(), if the invoking string is less than the string compared?**

- |                          |                             |
|--------------------------|-----------------------------|
| (a) Zero                 | (b) Value greater than zero |
| (c) Value less than zero | (d) None of the above       |

**Answer:** (c) Value less than zero

**(vi) while omitting background details or explanations.**

- |                   |                  |
|-------------------|------------------|
| (a) Encapsulation | (b) Polymorphism |
| (c) Inheritance   | (d) Abstraction  |

**Answer:** (d) Abstraction

**(vii) What is the process that allows control over which parts of a program can access a class's members?**

- (a) Polymorphism
- (b) Abstraction
- (c) Encapsulation
- (d) Recursion

**Answer:** (c) Encapsulation

**(viii) Which class is inherited by the character and Boolean wrapper class?**

- (a) Object
- (b) Number
- (c) Both (a) and (b)
- (d) None of these

**Answer:** (a) Object

**(ix) The time complexity of the linear search algorithm is \_\_\_\_.**

- (a)  $O(n)$
- (b)  $O(\log n)$
- (c)  $O(n^2)$
- (d)  $O(n \log n)$

**Answer:** (a)  $O(n)$

**(x) This is a group of similar type of classes.**

- (a) package
- (b) void
- (c) extends
- (d) import

**Answer:** (a) package

**(xi) trim( ) is used for \_\_\_\_.**

- (a) Remove leading and trailing spaces in a string
- (b) Removes character
- (c) Shorten string
- (d) None of the above

**Answer:** (a) Remove leading and trailing spaces in a string

**(xii) Choose the odd one**

- (a) if-else
- (b) if
- (c) switch case
- (d) while()

**Answer:** (d) while()

**(xiii) Which of the following are non-executable statements that are ignored by the compiler or interpreter?**

- (a) Blocks
- (b) Variables
- (c) Statements
- (d) Comments

**Answer:** (b) Variables

**(xiv) Array data access using\_\_\_\_\_.**

- (a) operator
- (b) index
- (c) variable
- (d) pointer

**Answer:** (c) variable

**(xv) Which of the following loop checks the condition first before entering in a loop?**

- (a) while
- (b) do-while
- (c) Both (a) and (b)
- (d) None of these

**Answer:** (a) while

**(xvi) Assertion (A) :** Local variables are defined within a method, constructor, or block.

**Reason (R) :** Local variables are not visible outside the method, constructor or block.

- (a) Both Assertion (A) and Reason (R) are true and Reason (R) is a correct explanation of Assertion (A).
- (b) Both Assertion (A) and Reason (R) are true and Reason (R) is not a correct explanation of Assertion (A).
- (c) Assertion (A) is true and Reason (R) is false.
- (d) Assertion (A) is false and Reason (R) is true.

**Answer:** (a) Both Assertion (A) and Reason (R) are true and Reason (R) is a correct explanation of Assertion (A).

**(xvii) Read the following text and choose the correct answer.**

A class is a grouping of objects of the same type, where each object shares the same attributes and common behaviors defined within the class.

**What does a class?**

- (a) Takes different forms from one.
- (b) Binds data and methods in a single unit.
- (c) Hides the necessary details of the object.
- (d) Shares common properties and relationship.

**Answer:** (d) Shares common properties and relationship.

**(xviii) This error is when your program compiles and runs, but does the wrong thing.**

- (a) Logic error
- (c) Syntax error

- (b) Runtime error
- (d) Checked error

**Answer:** (c) Syntax error

**(xix) Assertion (A) :** Wrapper class is used to convert any primitive data type into object.

**Reason (R) :** To achieve call by reference, we use the wrapper class.

- (a) Both Assertion (A) and Reason (R) are true and Reason (R) is a correct explanation of Assertion (A).
- (b) Both Assertion (A) and Reason (R) are true but Reason (R) is not a correct explanation of Assertion (A).
- (c) Assertion (A) is true and Reason (R) is false.
- (d) Assertion (A) is false and Reason (R) is true.

**Answer:** (b) Both Assertion (A) and Reason (R) are true but Reason (R) is not a correct explanation of Assertion (A).

**(xix) Java source code is compiled into\_\_\_\_\_by Java compiler.**

- (a) byte code
- (b) JVM
- (c) Java interpreter
- (d) JRE

**Answer:** (c) Java interpreter

## QUESTION 2.

**(i) Write a statement to increase the value assigned to variable K by 2 and then to display the value.**

**Answer:**

```
int K = 0;  
K = K+2;  
System.out.println(K);
```

**(ii) Write the statement in Java for the following mathematical expression.**

$$p^3 + q^4 - \frac{1}{2}r$$

**Answer:**

```
Math.pow(p, 3)+ Math.pow(q, 4) -  
    (0.5)*r;
```

**(iii) If arr[ ] = {10, 20, 30, 40};**

(a) What is arr.length?

(b) What is arr[1]?

**Answer:**

(a) arr.length is 4.

(b) arr[1] is 20.

**(iv) Determine the output.**

(a) a1 = "good";

a2 = "bye";

System.out.println(a1.concat(a2));

(b) s1 = "HELLO";

s2 = "hello";

s1.compareToIgnoreCase(s2);

**Answer:** (a) goodbye

(b) zero

**(v) Determine the value of m after evaluating the following expression.**

m+=10%++n+n++/4; when int m=12, n=3?

**Answer:**

$$m += 10\% ++n + n++ / 4$$

$$m = m + 10\% ++n + n++ / 4$$

$$= 12 + 10\% 4 + 4/4$$

$$= 12 + 2 + 4/4$$

$$= 12 + 2 + 1$$

So, m = 15

**(vi) How many times the following loop will execute?**

```

int n = 1, i = 1;
do
{
    n ++;
    i ++;
    if(i == 4)
    {
        n = 1;
        break;
    }
} while(i < 5);

```

**Answer:** The Loop executes 3 times before break is encountered, terminating the loop.

**(vii) What is the output of the following code ?**

```

String s1 = "Sachin";
String s2 = "Sachin";
if(s1.equals(s2))
    System.out.println("s1 is equal
                        to s2");

if(s1 == s2)
    System.out.println("s1 and s2
                        are equal");

```

**Answer:**

Output

s1 is equal to s2

s1 and s2 are equal

**(viii) Determine the number of bytes and bits used by an integer array with 5 elements.**

**Answer:** The number of bytes and bits used by an integer array with 5 elements depends on the size of each integer. Typically, an integer in most programming languages (like C, Java, Python) takes 4 bytes (32 bits).

For 5 integers:



- Bytes:  $5 \text{ elements} \times 4 \text{ bytes} = 20 \text{ bytes}$
- Bits:  $5 \text{ elements} \times 32 \text{ bits} = 160 \text{ bits}$

Thus, the integer array uses 20 bytes or 160 bits.

**(ix) What will be the output of the following code?**

```
String s = "Unity\n In\n
           Diversity\tIndia";
System.out.print(s);
```

**Answer:**

```
Unity
In
Diversity India
```

**(x) What will be the output after executing the following code?**

```
for(int i=4;i<20;i+=4)
System.out.print(" " +Integer
                .toString(2*i));
```

**Answer:** 8    16    24    32

## SECTION - B

Attempt any four questions from this section.

### QUESTION 3.

Create a class named **Armstrong** with a main function to determine if a user-entered number is an Armstrong number. An Armstrong number is a number that equals the sum of the cubes of its digits.

Examples of Armstrong numbers include 0, 1, 153, 370, 371, and 407.

**Answer:**

```

public class Armstrong {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter a number: ");
        int number = scanner.nextInt();

        int originalNumber = number;
        int sum = 0;

        while (number > 0) {
            int digit = number % 10;
            sum += digit * digit * digit;
            number /= 10;
        }

        if (sum == originalNumber) {
            System.out.println(originalNumber + " is an Armstrong number.");
        } else {
            System.out.println(originalNumber + " is not an Armstrong number.");
        }
    }
}

```

#### QUESTION 4.

**Write a Java program that prompts the user to enter the elements of an array and checks for the occurrences of positive numbers, negative numbers, and zeros.**

e.g. Input Array : 12, - 89, - 56, 0, 45, 56

Output                      3 Positive Numbers

                                 2 Negative Numbers

                                 1 Zero

#### Answer:

```

import java.util.Scanner;

public class ArrayAnalysis {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter the size of the array: ");
        int size = scanner.nextInt();
    }
}

```

```

int[] array = new int[size];

System.out.println("Enter the elements of the array:");
for (int i = 0; i < size; i++) {
    array[i] = scanner.nextInt();
}

int positiveCount = 0, negativeCount = 0, zeroCount = 0;

for (int i = 0; i < size; i++) {
    if (array[i] > 0) {
        positiveCount++;
    } else if (array[i] < 0) {
        negativeCount++;
    } else {
        zeroCount++;
    }
}

System.out.println("Output:");
System.out.println(positiveCount + " Positive Numbers");
System.out.println(negativeCount + " Negative Numbers");
System.out.println(zeroCount + " Zero");

scanner.close();
}
}

```

### QUESTION 5.

**Define a class Anagram which will check that entered string is anagram or not.**

An anagram is a string, which contains same characters but in different order.

e.g. army and mary.

**Answer:**

```

import java.util.Arrays;
import java.util.Scanner;

public class Anagram {

    private String str1;
    private String str2;

    // Constructor to initialize the strings
    public Anagram(String str1, String str2) {
        this.str1 = str1;
        this.str2 = str2;
    }
}

```

```

// Method to check if the strings are anagrams
public boolean isAnagram() {
    // Remove spaces and convert to lowercase
    String cleanedStr1 = str1.replaceAll("\\s+", "").toLowerCase();
    String cleanedStr2 = str2.replaceAll("\\s+", "").toLowerCase();

    // Convert strings to character arrays
    char[] charArray1 = cleanedStr1.toCharArray();
    char[] charArray2 = cleanedStr2.toCharArray();

    // Sort the character arrays
    Arrays.sort(charArray1);
    Arrays.sort(charArray2);

    // Compare sorted arrays
    return Arrays.equals(charArray1, charArray2);
}

public static void main(String[] args) {
    Scanner scanner = new Scanner(System.in);

    // Input strings from user
    System.out.print("Enter the first string: ");
    String string1 = scanner.nextLine();

    System.out.print("Enter the second string: ");
    String string2 = scanner.nextLine();

    // Create an instance of Anagram
    Anagram anagramChecker = new Anagram(string1, string2);

    // Check if they are anagrams and print the result
    if (anagramChecker.isAnagram()) {
        System.out.println "\"" + string1 + "\" and \"" + string2 +
        "\"" + " are anagrams.");
    } else {
        System.out.println "\"" + string1 + "\" and \"" + string2 +
        "\"" + " are not anagrams.");
    }

    scanner.close();
}
}

```

**QUESTION 6.**

A class Tel call calculates the monthly phone bill of a consumer. Some of the members of the class are given below:

<b>Class name</b>	<b>Tel call</b>
<b>Data members/Instance variables</b>	
Phone no.	Phone number
Name	Name of consumer
N	Number of calls made
Amt	Bill amount
<b>Member functions/Methods</b>	
Tel call(...)	Parameterized constructor to assign values to data members
Void compute()	To calculate the phone bill amount based on the slabs given below:
	<b>Number    Rate</b> <b>of calls</b>
	1-100      Rs. 500/- rental charge only
	101-200    Rs. 1.00/- per call rental charge
	201-300    Rs. 1.20/- per call rental charge
	above 300   Rs. 1.50/- per call rental charge
void dispdata()	To display the details in the specified format

**The calculations need to be done as per the slabs.**

Specify the class Tel call giving the details of the constructor, void compute( ) and void dispdata( ). In the main() function, create an object of type Telcall and display the phone bill in the following format:

Phone Number	XXXXXXXXXX
Name	XXX
Total calls	XXXXX
Amount	XXXX

**Answer:**

```

import java.util.Scanner;

class TelCall {
    private long phoneNo;
    private String name;
    private int n;
    private double amt;

    public TelCall(long phoneNo, String name, int n) {
        this.phoneNo = phoneNo;
        this.name = name;
        this.n = n;
    }

    public void compute() {
        if (n <= 100) {
            amt = 500;
        } else if (n <= 200) {
            amt = 500 + (n - 100) * 1.0;
        } else if (n <= 300) {
            amt = 500 + 100 + (n - 200) * 1.2;
        } else {
            amt = 500 + 100 + 120 + (n - 300) * 1.5;
        }
    }

    public void dispdata() {
        System.out.println("Phone Number: " + phoneNo);
        System.out.println("Name: " + name);
        System.out.println("Number of Calls: " + n);
        System.out.println("Bill Amount: Rs. " + amt);
    }

    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);

        System.out.print("Enter phone number: ");
        long phoneNo = sc.nextLong();

        System.out.print("Enter name: ");
        String name = sc.next();

        System.out.print("Enter number of calls: ");
        int n = sc.nextInt();

        TelCall telCall = new TelCall(phoneNo, name, n);
        telCall.compute();
        telCall.dispdata();

        sc.close();
    }
}

```

**QUESTION 7.**

Write a Java program to print the following pattern.

(i) 5  
5 4  
5 4 3  
5 4 3 2  
5 4 3 2 1

(ii) H E L L O  
H E L L  
H E L  
H E  
H

**Answer:**

```
import java.util.*;
import java.io.*;
public class Pattern
{
    public static void main(String
        args[]) throws IOException
    {
        InputStreamReader IR=new
            InputStreamReader(System.in);
        BufferedReader br=new Buffered
            Reader(IR);
        System.out.println("Choose the
            correct choice:");
        System.out.print("1. To print
            the first pattern...");
        System.out.println("2. To print
            the second pattern...");
        int ch=Integer.parseInt(br.read
            Line());
        switch(ch)
        {
            case 1:
```



```

Scanner sc = new Scanner
            (System.in);
System.out.print("How many
                rows you want in this
                    pattern?");
int rows = sc.nextInt();
System.out.println("Here is
                    your pattern...!!!");
for(int i=rows; i>=1; i--)
{
    for(int j=rows; j>=i; j--)
    {
        System.out.print(j+ " ");
    }
    System.out.println();
}
break;
case 2:
    System.out.println("Enter a
                        String: ");
    Scanner scr = new Scanner
                    (System.in);

    String s = scr.nextLine();
    int length = s.length();
    char [] a = s.toCharArray();
    System.out.println("\nPrinting
                        the pattern: ");
    for(int i=length-1; i>=0; i--)
    {
        for(int j=0; j<=i; j++)
        {
            System.out.print(a[j]);
        }
        System.out.println();
    }
    break;
default:
    System.out.println("Wrong
                        choice");
}
}
}

```

**QUESTION 8.**

**Write a Java program to read two strings append them together and return the result. If the strings are different lengths, remove characters from the beginning of longer string and make them equal length.**

[Hint If two strings are: "Arihant", "Publications", then output would be: "Arihantcations"]

**Answer:**

```
import java.util.*;
public class Main
{
    public String Concat(String st1,
                        String st2)
    {
        if(st1.length() == st2.length())
            return st1+st2;
        if(st1.length() > st2.length())
        {
            int diff = st1.length()
                    - st2.length();
```

# ICSE Paper 2018

## Computer Applications

---

### General Instructions:

- Answers to this Paper must be written on the paper provided separately.
- You will not be allowed to write during the first 15 minutes.
- This time is to be spent in reading the Question Paper.
- The time given at the head of this Paper is the time allowed for writing the answers.
- This Paper is divided into two Sections.
- Attempt all questions from Section A and any four questions from Section B.
- The intended marks for questions or parts of questions are given in brackets [ ].

---

### Section-A [40 MARKS]

(Attempt ALL Questions)

#### Question 1.

- (a) Define abstraction.
- (b) Differentiate between searching and sorting.
- (c) Write a difference between the functions `isUpperCase()` and `toUpperCase()`.
- (d) How are private members of a class different from public members ?
- (e) Classify the following as primitive or non-primitive data types :
  - (i) `char`
  - (ii) `arrays`
  - (iii) `int`
  - (iv) `classes`

#### Solution:

- (a) Abstraction is a process of hiding the implementation details and showing only functionality to the user.
- (b) Searching is a technique which is used to search a particular element in an array or string. Sorting is a technique which is used to rearrange the elements of an array or string in a particular order either ascending or descending.
- (c) The `isUpperCase()` method is used to check whether the given character is in upper case or not. It returns Boolean data type.

The toUpperCase() method is used to convert a character or string into upper case. It returns char or String type. •

(d) Scope of the private members is within the class whereas scope of the public members is global.

- (e) (i) char is primitive data type.
- (ii) arrays are non-primitive data type.
- (iii) int is primitive data type.
- (iv) classes are non-primitive data type.

### Question 2.

(a) (i) `int res = 'A';` [2]

What is the value of res ?

(ii) Name the package that contains wrapper classes.

(b) State the difference between while and do while loop. [2]

(r) `System.out.print("BEST");` [2]

`System.out.println("OF LUCK");`

Choose the correct option for the output of the above statements

(i) BEST OF LUCK

(ii) BEST

OF LUCK

(d) Write the prototype of a function check which takes an integer as an argument and returns a character. [2]

(e) Write the return data type of the following function. [2]

(i) `endsWith()`

(ii) `log()`

### Solution:

(a) (i) Value of res is 65.

(ii) `Java.lang`

(b)

<i>while</i>	<i>do-while</i>
(i) The statements can be executed.	(i) The loop executes the statement at least once.
(ii) The condition is tested before execution	(ii) The condition is tested after execution.
(iii) The loop terminates if the condition becomes false.	(iii) If the condition is false, the computer keeps executing the loop.

(c) (i) BEST OF LUCK is the correct option.

- (c) char check(int x)
- (e) (i) Boolean
- (ii) double

**Question 3.**

- (a) Write a Java expression for the following :

$$\frac{\sqrt{3x+x^2}}{a+b}$$

- (b) What is the value of y after evaluating the expression given below ?

`y += ++y+y-- -y;` when `int y=8`

- (c) Give the output of the following : [2]

(i) `Math.floor(-4.7)`

(ii) `Math.ceil(3.4) + Math.pow(2,3)`

- (d) Write two characteristics of a constructor. [2]

- (e) Write the output for the following : [2]

`System.out.prindn("Incredible" + "\n" + "world");`

- (f) Convert the following if else if construct into switch case [2]

`if (var == 1)`

`System.out.println("good");`

`else if (var == 2)`

`System.out.prindn("better");`

`else if (var == 3)`

`System.out.prindn("best");`

`else`

`System.out.prindn("invalid");`

- (g) Give the output of the following string functions : [2]

(i) `"ACHIEVEMENT".replaceCE, 'A')`

(ii) `"DEDICATE".compareTo("DEVOTE")`

- (h) Consider the following String array and give the output [2]

`String arr[] = {"DELHI", "CHENNAI", "MUMBAI", "LUCKNOW", "JAIPUR"};`

`System.out.println(arr[0].length() > arr[3].length());`

`System.out.print(arr[4], substring(0,3));`

- (i) Rewrite the following using ternary operator : [2]

`if (bill > 10000)`

`discount = bill * 10.0/100;`

`else`

`discount = bill * 5.0/100;`

- (i) Give the output of the following program segment and also mention how many times the loop is executed : [2]

```
int i;  
for (i = 5; i > 10; i++)  
System.out.println(i);  
System.out.println(i*4);
```

**Solution:**

- (a)  $\text{Math.sqrt} * (3 * x + \text{Math.pow}(x, 2)) / (a + b);$
- (b)  $8 + (9 + 9 + 7) = 8 + 25 = 33$
- (c)  $(0 - 5.0)$  (it) 12.0
- (d) (i) Constructor has the same name as of class.  
(ii) Constructor gets invoked when an object is created.
- (e) Incredible  
world
- (f) 

```
switch ( ) {  
case 1:  
System.out.println( "good");  
break; .  
case 2:  
System.out.println( "better");  
break;  
case 3:  
System.out.println( "invalid");  
break;  
}
```
- (g) (i) ACHIAVAMANT  
(ii) - 18
- (h) false (at index 0, DELHI consists of 5 characters, at index 3, LUCKNOW consists of 7 characters. Therefore  $5 > 7$  is false)  
JAI (at index 4, JAIPUR exists and extract its three characters)
- (i)  $\text{discount} = \text{bill} > 100 ? \text{bill} * 10.0 / 100 : \text{bill} * 5.0 / 100;$
- (j) 20. Loop will be executed for 0 times.

**Section-B [60 Marks]**

Attempt any four questions from this Section

The answers in this Section should consist of the Programs in either Blue J environment  
or any

program environment with Java as the base.

Each program should be written using Variable descriptions/Mnemonic Codes so that  
the logic of

the program is clearly depicted.

Flow-Charts and Algorithms are not required.

---

**Question 4.**

Design a class Railway Ticket with following description : [15]

Instance variables/s data members :

String name : To store the name of the customer

String coach : To store the type of coach customer wants to travel

long mobno : To store customer's mobile number

int amt : To store basic amount of ticket

int totalamt : To store the amount to be paid after updating the original amount

Member methods

void accept ( ) – To take input for name, coach, mobile number and amount

void update ( ) – To update the amount as per the coach selected

Type of Coaches	Amount
First_ AC	700
Second_AC	500
Third _AC	250
sleeper	None

void display( ) – To display all details of a customer such as name, coach, total amount and mobile number.

Write a main method to create an object of the class and call the above member methods.

**Solution:**

```
import java.io.*;
import java.util.Scanner; class RailwayTicket {
String name, coach;
long mobno;
int amt, totalamt;
void accept( ) throws IOException {
Scanner sc = new Scanner(System.in);
System.out.print("Enter Passenger's Name: ");
name = sc.next();
System.out.print("Enter Mobile Number:");
mobno = sc.nextInt();
System.out.print("Enter Coach (FirstAC/SecondAC/ThirdAC/sleeper):");
```



```

coach = sc.next( );
System.out.print("Enter basic amount of ticket:");
amt = sc.next( );
}
void update() {
if (coach.equals("First_AC"))
totalamt = amt + 700;
else
if (coach.equals("Second_AC"))
totalamt = amt + 500; .
else
if (coach.equals("Third_AC"))
totalamt = amt + 250;
else
totalamt = amt;
}
void display() {
System.out.println("\n\n Name : " + name);
System.out.println("Coach : " + coach);
System.out.println("Total Amount : " + totalamt);
System.out.println("Mobile No. : " + name);
}
public static void main (String args[] ) throws IOException {
RailwayTicket t = new RailwayTicket();
t.accept();
t.update();
t.display();
}
}

```

### Question 5.

Write a program to input a number and check and print whether it is a Pronic number [15] or not. (Pronic number is the number which is the product of two consecutive integers)

Examples :  $12 = 3 \times 4$  .  
 $20 = 4 \times 5$   
 $42 = 6 \times 7$

### Solution:

```

import java.io.*;
import java.util. Scanner;
class Pronic]

```

```

public static void main(String argsQ) throws IOException {
Scanner sc = new Scanner(System.in);
System.out.print("Enter the number: ");
int n = sc.nextInt();
int i = 0;
while(i * (i + 1) < n) {
i++;
}
if(i * (i + 1) == n){
System.out.println(n + " is a Pronic Number.");
}
else {
System.out.println(n + " is not a Pronic Number.");
}
}
}

```

#### Question 6.

Write a program in Java to accept a string in lower case and change the first letter of every word to upper case. Display the new string. [15]

Sample input: we are in cyber world

Sample output : We Are In Cyber World

#### Solution:

```

import java.io.*;
import java.util.Scanner;
class ChangeLetter {
public static void main(String args[] ) throws IOException {
Scanner sc = new Scanner(System.in);
System.out.print("Enter String in lowercase:");
String str1 = sc.next( );
str1 = "" +str1;
String str2 = " ";
for (int i = 0; i<str1.length( ); i+ +) {
if(str1.charAt(i) == " ") {
str2 = str2 + " " +Character.toUpperCase(str1.charAt(i+1));
i+ + ;
}.
else
str2= str2 + str1.charAt(i);
}
System.out.println(str2.trim( ));
}
}

```

```
}  
}
```

### Question 7.

Design a class to overload a function volume() as follows : [15]

(i) double volume (double R) – with radius (R) as an argument, returns the volume of sphere using the formula.

$$V = \frac{4}{3} \times \frac{22}{7} \times R^3$$

(ii) double volume (double H, double R) – with height(H) and radius(R) as the arguments, returns the volume of a cylinder using the formula.

$$V = \frac{22}{7} \times R^2 \times H$$

(iii) double volume (double L, double B, double H) – with length(L), breadth(B) and Height(H) as the arguments, returns the volume of a cuboid using the formula.

### Solution:

```
class ShapesVolume {  
    public static double volume (double R) {  
        double V = 4.0 / 3, * 22.0 / 7 * Math.pow(R, 3);  
        return V;  
    }  
    public static double volume(double H, double R) {  
        double V = 22.0 / 7 * R * R * H ;  
        return V;  
    }  
    public static double volume (double L, double B, double H) {  
        double V = L * B * H;  
        return V;  
    }  
}
```

### Question 8.

Write a menu driven program to display the pattern as per user's choice. [15]

#### Pattern 1

ABCDE  
ABCD  
ABC  
AB  
A

#### Pattern 2

B  
LL  
UUU  
EEEE

For an incorrect option, an appropriate error message should be displayed.

**Solution:**

```
import java.io.*;
import java.util.Scanner;
class Pattern {
public static void main(String args[]) throws IOException {
Scanner sc = new Scanner(System.in);
System.out.println("::::MENU::::")
System.out.println(" 1. To display ABCD Pattern");
System.out.print(" 2. To display Word Pattern");
System.out.print("Enter your choice:");
int ch= sc.nextInt();
switch(ch) {
case 1:
for (char i = 'E'; i >= 'A'; i- -){
for(char j = 'A';j <=i;j ++){
System.out.print(j);
}
System.out.prindn( );
}
break;
case 2:
String S = "BLUE";
for (int i = 0; i < S.length(); i+ +) {
for(int j = 0; j < =i; j + +) {
System.out.print(S.charAt(i));
}
System.out.println();
}
break;
default:
System.out.println("Invalid Input");
break;
}
}
}
```

**Question 9.**

Write a program to accept name and total marks of N number of students in two single subscript array name[] and total marks[ ]. [15]  
Calculate and print:

(i) The average of the total marks obtained by N Number of students.

[average = (sum of total marks of all the students)/N]  
(ii) Deviation of each student's total marks with the average.  
[deviation = total marks of a student – average] '

**Solution:**

```
import java.io.*;
import java.util. Scanner;
class NameMarks {
public static void main(String args0) throws IOException {
Scanner sc = new Scanner(System.in);
System.out.print("Enter number of students:");
int N = sc.nextInt( );
String named = new String[N];
int totalmarksG = new int[N];
double deviation[ ] = new double[N];
double sum = 0;
for (int i = 0; i < N; i+ +) {
System.out.print("Enter Name of the Student:");
name[i] = sc.next( );
System.out.print("Enter Marks:");
totalmarks[i] = sc.nextInt();
sum = sum + totalmarks [i];
}
double average = sum / N;
System.out.println("The average of the total marks of " +N+" number of students:"
+average);
for (int i = 0; i < N; i+ +) {
deviaddon[i] = total marks (i) – average;
System.out.println("Deviation of" + name[i] + "s marks with the average:" +deviation[i]);
}
}
}
```

# ICSE Paper 2019

## Computer Applications

---

### General Instructions :

- Answers to this Paper must be written on the paper provided separately.
  - You will not be allowed to write during the first 15 minutes.
  - This time is to be spent in reading the Question Paper.
  - The time given at the head of this Paper is the time allowed for writing the answers.
  - This Paper is divided into two Sections.
  - Attempt all questions from Section A and any four questions from Section B.
  - The intended marks for questions or parts of questions are given in brackets [ ].
- 

### Section-A [40 Marks]

(Attempt ALL Questions)

#### Question 1.

- (a) Name any two basic principles of Object-oriented Programming.
- (b) Write a difference between unary and binary operator.
- (c) Name the keyword which :
  - (i) indicates that a method has no return type.
  - (ii) makes the variable as a class variable.
- (d) Write the memory capacity (storage size) of short and float data type in bytes.
- (e) Identify and name the following tokens :

- (i) public
- (ii) 'a'
- (iii) ==
- (iv) {}

#### Solution.

- (a) Abstraction and encapsulation are the basic principles of Object-oriented Programming.
- (b)

Unary Operators	Binary Operators
(i) The operators which act upon a single operand are called unary operators.	(i) The operators which require two operands for their action are called binary operators.
(ii) They are pre-increment and post increment (+ +)	(ii) They are mathematical operators and relational operators.

(c)

(i) void

(ii) static

(d) (i) short: 2 bytes

(ii) float: 4 bytes

(e) (i) keyword

(ii) literal

(iii) operator

(iv) separator

### Question 2.

(a) Differentiate between if else if and switch-case statements. [2]

(b) Give the output of the following code : [2]

```
String P = "20", Q = "19",
int a = Integer.parseInt(P);
int b = Integer.valueOf(Q);
System.out.println(a+" "+b);
```

(c) What are the various types of errors in Java ? [2]

(d) State the data type and value of res after the following is executed : [2]

```
char ch = '9';
res = Character.isDigit(ch);
```

(e) What is the difference between the linear search and the binary search technique?  
[2]

### Solution.

(a)

<b>if else if</b>	<b>switch-case</b>
(i) It evaluates integer, character, pointer or floating-point type or boolean type.	(i) It evaluates only character or integer value.
(ii) Which statement will be executed depend upon the output of the expression inside if statement.	(ii) Which statement will be executed is decided by user.

- (b) 2019  
(c) Syntax error, Runtime error, Logical error  
(d) boolean  
True  
(e)

<b>Linear Search</b>	<b>Binary Search</b>
(i) Linear search works both for sorted and unsorted data.	(i) Binary search works on sorted data (either in ascending order or in descending order).
(ii) Linear search begins at the start of an array i.e. at 0th position.	(ii) This technique divides the array in two halves, and the desired data item is searched in the halves.

### Question 3.

- (a) Write a Java expression for the following : [2]  
 $|x^2 + 2xy|$   
(b) Write the return data type of the following functions : [2]  
(i) startsWith( )  
(ii) random( )  
(r) If the value of basic=1500, what will be the value of tax after the following statement is executed? [2]  
tax = basic > 1200 ? 200 : 100;  
id) Give the output of following code and mention how many times the loop will execute ? [2]  

```
int i;
for(i=5; i>=1;i~)
{
if(i%2 ==1)
continue;
System.out.print(i+ "
}

```

  
(e) State a difference between call by value and call by reference. [2]



(f) Give the output of the following: [2]

`Math.sqrt(Math.max(9, 16))`

(g) Write the output for the following: [2]

`String s1 = "phoenix"; String s2 = "island";`

`System.out.println(s1.substring(0).concat(s2.substring(2)));`

`System.out.println(s2.toUpperCase());`

(h) Evaluate the following expression if the value of  $x=2, y=3$  and  $z=1$ . [2]

$v = x + -z + y + +y$

(i) `String x[] = {"Artificial intelligence", "IOT", "Machine learning", "Big data"};` [2]

Give the output of the following statements:

(i) `System.out.println(x[3]);`

(ii) `System.out.println(x.length);`

(j) What is meant by a package? Give an example. [2]

### **Solution.**

(a) `Math.abs((x * x) + (2 * x * y));`

(b) (i) boolean

(ii) double

(c) 200

(d) 4 2

Loop will execute 5 times.

(e)

Call by Value	Call by Reference
(i) In call by value the method creates its new set of variables (formal parameters) to copy the value of actual parameters and works with them.	(i) In call by reference, reference of the actual parameters is passed on to the method. No new set of variables is created.
(ii) Any change made in the formal parameter is not reflected in the actual parameter.	(ii) Any change made in the formal parameter is always reflected in the actual parameters.
(iii) Primitive data types are passed by call by value.	(iii) Reference types like (objects, array etc.) are passed by call by reference.

(f) 4.0

(g) phoenix land

ISLAND

(h)  $= 2 + 0 + 3 + 4$

(i) (i) Big data

(ii) 4

(j) A package is an organized collection of classes which is included in the program as per the requirement of the program. For example java.io package is included for input and output operations in a program.

### Section -B [60 Marks]

Attempt any four questions from this Section

The answers in this Section should consist of the Programs in either Blue J environment or any

program environment with Java as the base.

Each program should be written using Variable descriptions/Mnemonic Codes so that the logic of

the program is clearly depicted.

Flow-Charts and Algorithms are not required.

#### Question 4.

Design a class name ShowRoom with the following description :

Instance variables/ Data members :

String name – To store the name of the customer

long mobno – To store the mobile number of the customer

double cost – To store the cost of the items purchased

double dis – To store the discount amount

double amount – To store the amount to be paid after discount

Member methods: –

ShowRoom() – default constructor to initialize data members

void input() – To input customer name, mobile number, cost

void calculate() – To calculate discount on the cost of purchased items, based on following criteria

Cost	Discount (in percentage)
Less than or equal to ₹ 10000	5%
More than ₹ 10000 and less than or equal to ₹ 20000	10%
More than ₹ 20000 and less than or equal to ₹ 35000	15%
More than ₹ 35000	20%

void display() – To display customer name, mobile number, amount to be paid after discount

Write a main method to create an object of the class and call the above member

methods.

**Solution.**

```
import java.io.*;
import java.util.*;
class ShowRoom {
String name;
long mobno;
double cost;
double dis;
double amount;
ShowRoom() {
name = " ";
mobno = 0;
cost = 0;
dis = 0;
amount = 0;
}
void input() {
Scanner sc = new Scanner(System.in);
System.out.println("EnterName:");
name = sc.nextLine();
System.out.println("Enter Mobile number:");
mobno = sc.nextLong();
System.out.println("Enter cost:");
cost = sc.nextDouble();
}
void calculate() {
if (cost <= 10000){
dis = cost*5/100;
amount = cost - dis;
}
else
if (cost > 10000 && cost <= 20000){
dis = cost* 10/100;
amount = cost - dis;
}
else
if (cost > 20000 && cost <= 35000){
dis = cost* 15/100;
amount = cost - dis;
}
else
```

```

if (cost > 35000){
dis = cost*20/100;
amount = cost – dis;
}
}
void display( ) {
System.out.println("Name::" +name);
System.out.println("Mobile No.:" +mobno);
System.out.println("Amount::" +amount);
}
public static void main(String args( )) {
ShowRoom ob = new ShowRoom( );
ob.input( );
ob.calculate( );
ob.display( );
}
}

```

#### Question 5.

Using the switch-case statement, write a menu driven program to do the following : [15]

(a) To generate and print Letters from A to Z and their Unicode Letters Unicode

Letters	Unicode
<b>A</b>	<b>65</b>
<b>B</b>	<b>66</b>
.	.
.	.
.	.
<b>Z</b>	<b>90</b>

(b) Display the following pattern using iteration (looping) statement: 1

```

1
1 2
1 2 3
1 2 3 4
1 2 3 4 5

```

**Solution.**

```

import java.io.*;
import java.util.*;
class SwitchCase {
public static void main(String args[] ) {
Scanner sc = new Scanner (System.in);
System.out.println(" 1. Enter 1 for Unicode:");
System.out.println(" 2. Enter 2 for Pattern:");
System.out.println("Enter your choice:");
int choice = sc.nextInt();
switch(choice){
case 1:
char ch;
System.out.println( "Letters \t Unicode");
for (ch = 'A'; ch <= 'Z'; ch++) {
System.out.println(ch + "\t" + (int)ch);
}
break;
case 2:
int i, j;
for (i = 1; i <= 5; i++) {
for (j = 1; j <= i; j++)
{
System.out.print(j + " ");
}
System.out.println();
}
break;
default:
System.out.println("Wrong choice entered:");
}
}
}

```

#### **Question 6.**

Write a program to input 15 integer elements in an array and sort them in ascending order using the bubble sort technique. [15]

#### **Solution.**

```

import java.io.*;
import java.util.*;
class AscendingOrder {
public static void main(String args[]) {
int i, j, temp;

```

```

Scanner sc = new Scanner(System.in);
int arr[] = new int[15];
System.out.println("Enter 15 integers:");
for (i = 0; i <= 15; i++) {
    arr[i] = sc.nextInt();
    for(i = 0; i < 14; i++){
        for(j = 0; j < 14 - i; j++){
            if(arr[j] > arr[j + 1]){
                temp = arr[j];
                arr[j] = arr[j + 1];
                arr[j + 1] = temp;
            }
        }
    }
}
System.out.println("Elements in ascending order are:");
for (i = 0; i < 15; i++) {
    System.out.println(arr[i]);
}
}
}
}

```

#### Question 7.

Design a class to overload a function series() as follows: [15]

(a) void series (int x, int n) – To display the sum of the series given below:

$x^1 + x^2 + x^3 + \dots x^n$  terms

(b) void series (int p) – To display the following series:

0, 7, 26, 63 p terms.

(c) void series () – To display the sum of the series given below:

$$\frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \dots + \frac{1}{10}$$

#### Solution.

```

import java.io.*;
import java.util.*;
class OverloadSeries {
    void series( int x, int n) {
        int i;
        double a;
        double sum = 0;
        for (i = 1; i <= n; i++) {

```

```

a = Math.pow(x, i);
sum = sum + a;
}
System.out.println("Sum::" +sum)r
}
void series(int p) {
int i;
for (i = 1; i <= p; i++) {
System.out.println((i * i * i) - 1 + " ");
}
}
void series() {
double i;
double s = 0;
for (i =-2; i <= 10; i+ +) {
s = s + 1/i;
}
System.out.println("Sum:" +s);
}
}

```

### Question 8.

Write a program to input a sentence and convert it into uppercase and count and display the total number of words starting with a letter 'A'. [15]

Example:

Sample Input: ADVANCEMENT AND APPLICATION OF INFORMATION TECHNOLOGY  
ARE EVER CHANGING.

Sample Output : Total number of words starting with letter 'A' = 4.

### Solution.

```

import java.io.*;
import java.util.*;
class UpperCount {
public static void main(String args[] ) {
int i, a;
Scanner sc = new Scanner(System.in);
String str, str1, str2;
System.out.println("Enter sentence::");
str = sc.nextLine();
str1 = str.toUpperCase();
str2 = "" + str1;
a = 0; ,

```

```

for (i = 0; i <= str2.length(); i++) {
    if(str2.charAt(i) == ' ')
        if(str2.charAt(i + 1) == 'A');
        a++;
    }
    System.out.println("Total number of words starting with letter 'A::" + a);
}
}

```

### Question 9.

A tech number has even number of digits. If the number is split in two equal halves, then the square of sum of these halves is equal to the number itself. Write a program to generate and print all four digit tech numbers. [15]

Example :

Consider the number 3025

Square of sum of the halves of 3025 =  $(30+25)^2$

=  $(55)^2$

= 3025 is a tech number.

### Solution.

```

import java.io.*;
import java.util.*;
class TechNumber {
    public static void main(String args[] ) {
        int i, a, b, sum;
        String n;
        System.out.println("Four Digits Tech Numbers are::");
        for(i = 1000; i < 10000; i++) {
            n = i + "";
            a = Integer.parseInt(n.substring(0, 2));
            b = Integer.parseInt(n.substring(2));
            sum = (int)Math.pow((a + b), 2);
            if (sum == i)
                System.out.println(i);
        }
    }
}

```



# COMPUTER APPLICATIONS

(Theory)

(Two Hours)

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*The time given at the head of this Paper is the time allowed for writing the answers.*

---

*This Paper is divided into two Sections.*

*Attempt **all** questions from **Section A** and **any four** questions from **Section B**.*

*The intended marks for questions or parts of questions are given in brackets [ ].*

---

## SECTION A (40 Marks)

*Attempt **all** questions*

### Question 1.

- (a) Define Java byte code. [2]
- (b) Write a difference between *class* and an *object*. [2]
- (c) Name the following: [2]
  - (i) The keyword which converts variable into constant.
  - (ii) The method which terminates the entire program from any stage.
- (d) Which of the following are primitive data types? [2]
  - (i) double
  - (ii) String
  - (iii) char
  - (iv) Integer
- (e) What is an operator? Name any two types of operators used in Java. [2]

**Question 2.**

- (a) What is autoboxing in Java? Give an example. [2]
- (b) State the difference between length and length() in Java. [2]
- (c) What is constructor overloading? [2]
- (d) What is the use of *import* statement in Java? [2]
- (e) What is an infinite loop? Give an example. [2]

**Question 3.**

- (a) Write a Java expression for the following: [2]

$$\sqrt{b^2 - 4ac}$$

- (b) Evaluate the following if the value of x=7, y=5 [2]

`x+=x++ + x + ++y`

- (c) Write the output for the following: [2]

`String s1 = "Life is Beautiful";`

`System.out.println ("Earth" + s1.substring(4));`

`System.out.println( s1.endsWith("L") );`

- (d) Write the output of the following statement: [2]

`System.out.println("A picture is worth \t \"A thousand words.\" ");`

- (e) Give the output of the following program segment and mention how many times the loop will execute: [2]

`int k;`

`for ( k = 5 ; k <= 20 ; k += 7 )`

`if ( k%6==0 )`

`continue;`

`System.out.println ( k );`

- (f) What is the data type returned by the following library methods? [2]

(i) `isWhitespace()`

(ii) `compareToIgnoreCase()`

- (g) Rewrite the following program segment using logical operators: [2]

```
if ( x > 5 )
```

```
if ( x > y )
```

```
System.out.println (x+y);
```

- (h) Convert the following **if else if** construct into **switch case**: [2]

```
if (ch== 'c' || ch=='C')
```

```
System.out . print("COMPUTER");
```

```
else if (ch== 'h' || ch=='H')
```

```
System.out . print("HINDI");
```

```
else
```

```
System.out . print("PHYSICAL EDUCATION");
```

- (i) Give the output of the following: [2]

(i) Math.pow (36,0.5) + Math.cbrt (125)

(ii) Math.ceil (4.2 ) + Math.floor (7.9)

- (j) Rewrite the following using **ternary** operator: [2]

```
if(n1>n2)
```

```
r = true;
```

```
else
```

```
r = false;
```

## SECTION B (60 Marks)

Attempt *any four* questions from this Section.

*The answers in this Section should consist of the Programs in either Blue J environment or any program environment with Java as the base.*

*Each program should be written using Variable descriptions/Mnemonic Codes so that the logic of the program is clearly depicted.*

*Flow-Charts and Algorithms are not required.*

### Question 4.

A private Cab service company provides service within the city at the following rates: [15]

	AC CAR	NON AC CAR
UPTO 5 KM	₹ 150 /-	₹ 120 /-
BEYOND 5 KM	₹ 10/-PER KM	₹ 08/- PER KM

Design a class **CabService** with the following description:

*Member variables /data members:*

- String car\_type - To store the type of car (AC or NON AC)
- double km - To store the kilometer travelled
- double bill - To calculate and store the bill amount

*Member methods :*

- CabService() - Default constructor to initialize data members.  
String data members to " " and double data members to 0.0.
- void accept () - To accept car\_type and km (using Scanner class only).
- void calculate () - To calculate the bill as per the rules given above.
- void display() - To display the bill as per the following format  
CAR TYPE:  
KILOMETER TRAVELLED:  
TOTAL BILL:

Create an object of the class in the main method and invoke the member methods.

**Question 5.**

Write a program to search for an integer value input by the user in the sorted list given [15]  
below using **binary** search technique. If found display "Search Successful" and print  
the element, otherwise display "Search Unsuccessful"

{31, 36, 45, 50, 60, 75, 86, 90}

**Question 6.**

Write a program to input a **sentence** and convert it into uppercase and display each [15]  
word in a separate line.

Example: Input : India is my country

Output : INDIA

IS

MY

COUNTRY

**Question 7.**

Design a class to overload a method Number( ) as follows: [15]

- (i) void Number (int num , int d) - To count and display the frequency of a  
digit in a number.

Example:

num = 2565685

d = 5

Frequency of digit 5 = 3

- (ii) void Number (int n1) - To find and display the sum of even digits of  
a number.

Example:

n1 = 29865

Sum of even digits = 16

Write a main method to create an object and invoke the above methods.

### Question 8.

Write a menu driven program to perform the following operations as per user's choice: [15]

- (i) To print the value of  $c=a^2+2ab$ , where **a** varies from **1.0** to **20.0** with increment of **2.0** and **b=3.0** is a constant.
- (ii) To display the following pattern using **for** loop:

```
A
AB
ABC
ABCD
ABCDE
```

Display proper message for an invalid choice.

### Question 9.

Write a program to input and store integer elements in a double dimensional array of size **3 x 3** and find the **sum** of elements in the left diagonal. [15]

Example:

```
1  3  5
4  6  8
9  2  4
```

Output: Sum of the left diagonal elements =  $(1 + 6 + 4) = 11$

# COMPUTER APPLICATIONS

*Maximum Marks: 100*

*Time allowed: Two hours*

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*This Paper is divided into two Sections.*

*Attempt all questions from Section A and any four questions from Section B.*

*The intended marks for questions or parts of questions are given in brackets[ ].*

## SECTION A (40 Marks)

*(Attempt all questions from this Section.)*

### Question 1

[20]

Choose the correct answers to the questions from the given options.

(Do not copy the questions, write the correct answers only.)

- (i) A mechanism where one class acquires the properties of another class:
  - (a) Polymorphism
  - (b) Inheritance
  - (c) Encapsulation
  - (d) Abstraction
- (ii) Identify the type of operator &&:
  - (a) ternary
  - (b) unary
  - (c) logical
  - (d) relational

(iii) The Scanner class method used to accept words with space:

- (a) next()
- (b) nextLine()
- (c) Next()
- (d) nextString()

(iv) The keyword used to call *package* in the program:

- (a) extends
- (b) export
- (c) import
- (d) package

(v) What value will `Math.sqrt (Math.ceil (15.3))` return?

- (a) 16.0
- (b) 16
- (c) 4.0
- (d) 5.0

(vi) The absence of which statement leads to *fall through* situation in switch case statement?

- (a) continue
- (b) break
- (c) return
- (d) `System.exit(0)`

(vii) State the type of loop in the given program segment:

```
for (int i = 5; i != 0; i - = 2)
```

```
System.out.println(i);
```

- (a) finite
- (b) infinite
- (c) null
- (d) fixed



(viii) Write a method prototype name `check()` which takes an integer argument and returns a char:

- (a) `char check()`
- (b) `void check (int x)`
- (c) `check (int x)`
- (d) `char check (int x)`

(ix) The number of values that a method can return is:

- (a) 1
- (b) 2
- (c) 3
- (d) 4

(x)

Predict the output of the following code snippet: `String P = "20", Q = "22";`

```
int a = Integer.parseInt(P);  
int b = Integer.valueOf(Q);  
System.out.println(a+" "+b);
```

- (a) 20
- (b) 20 22
- (c) 2220
- (d) 22

(xi)

The String class method to join two strings is:

- (a) `concat(String)`
- (b) `<string>.join(string)`
- (c) `concat(char)`
- (d) `Concat()`

(xii) The output of the function `"COMPOSITION".substring(3, 6)`:

- (a) POSI
- (b) POS
- (c) MPO
- (d) MPOS

(xiii) `int x = (int) 32.8;` is an example of \_\_\_\_\_ typecasting.

- (a) implicit
- (b) automatic
- (c) explicit
- (d) coercion



The code obtained after *compilation* is known as:

- (a) source code
- (b) object code
- (c) machine code
- (d) java byte code

(xv) Missing a semicolon in a statement is what type of error?

- (a) Logical
- (b) Syntax
- (c) Runtime
- (d) No error

(xvi) Consider the following program segment and select the output of the same when `n = 10` :

```
switch(n)
{
    case 10 : System.out.println(n*2);
    case 4 : System.out.println(n*4); break;
    default : System.out.println(n);
}
```

- (a) 20  
40
- (b) 10  
4
- (c) 20, 40
- (d) 10  
10

(xvii) A method which does not *modify* the value of variables is termed as:

- (a) Impure method
- (b) Pure method
- (c) Primitive method
- (d) User defined method

(xviii) When an object of a Wrapper class is converted to its corresponding primitive data type, it is called as \_\_\_\_\_.

- (a) Boxing
- (b) Explicit type conversion
- (c) Unboxing
- (d) Implicit type conversion

(xix)

The number of *bits* occupied by the value 'a' are:

- (a) 1 bit
- (b) 2 bits
- (c) 4 bits
- (d) 16 bits

(xx)

Method which is a part of a *class* rather than an instance of the class is termed as:

- (a) Static method
- (b) Non static method
- (c) Wrapper class
- (d) String method

## Question 2

(i) Write the Java expression for  $(a + b)^x$ . [2]

(ii)

Evaluate the expression when the value of  $x = 4$ : [2]

$$x * = - - x + x++ + x$$

- (iii) Convert the following do...while loop to for loop: [2]
- ```
int x=10;  
do  
{x--;  
System.out.print(x);  
}while (x>=1);
```
- (iv) Give the output of the following Character class methods: [2]
- (a) Character.toUpperCase('a')
- (b) Character.isLetterOrDigit('#')
- (v) Rewrite the following code using the if-else statement: [2]
- ```
int m= 400;  
double ch = (m>300) ? (m / 10.0) * 2: (m / 20.0) - 2;
```
- (vi) Give the output of the following program segment: [2]
- ```
int n = 4279; int d;  
while(n>0)  
{d=n%10;  
System.out.println(d);  
n=n/100;  
}
```
- (vii) Give the output of the following String class methods: [2]
- (a) "COMMENCEMENT".lastIndexOf('M')
- (b) "devote".compareTo("DEVOTE")
- (viii) Consider the given array and answer the questions given below: [2]
- ```
int x[] = {4,7,9,66,72,0,16};
```
- (a) What is the length of the array?
- (b) What is the value in x[4]?
- (ix) Name the following: [2]
- (a) What is an instance of the class called?
- (b) The method which has same name as that of the class name.

(x)

Write the value of  $n$  after execution:

[2]

```
char ch = 'd';
```

```
int n = ch + 5;
```

### SECTION B (60 Marks)

*(Answer any four questions from this Section.)*

*The answers in this section should consist of the programs in either BlueJ environment or any program environment with java as the base.*

*Each program should be written using variable description / mnemonic codes so that the logic of the program is clearly depicted.*

*Flowcharts and algorithms are not required.*

#### Question 3

[15]

Design a class with the following specifications:

Class name: **Student**

Member variables: name – name of student

age – age of student

mks – marks obtained

stream – stream allocated

(Declare the variables using appropriate data types)

Member methods:

**void accept()** – Accept name, age and marks using methods of Scanner class.

**void allocation()** – Allocate the stream as per following criteria:

mks

stream

$\geq 300$

Science and Computer

$\geq 200$  and  $< 300$

Commerce and Computer

$\geq 75$  and  $200$

Arts and Animation

$< 75$

Try Again

**void print()** – Display student name, age, mks and stream allocated.

Call all the above methods in main method using an object.

#### Question 4

[15]

Define a class to accept 10 characters from a user. Using **bubble sort** technique arrange them in ascending order. Display the sorted array and original array.

### Question 5

**Define a class to overload the function print as follows:**

**void print()**

to print the following format

1 1 1 1

2 2 2 2

3 3 3 3

4 4 4 4

5 5 5 5

```
void print(int n)
```

To check whether the number is a lead number. A lead number is the one whose sum of even digits are equal to sum of odd digits.

**e.g. 3669**      **odd digits sum = 3 + 9 = 12**

**even digits sum = 6 + 6 = 12**

**3669 is a lead number.**

### Question 6

[15]

**Define a class to accept a String and print the number of digits, alphabets and special characters in the string.**

**Example:** S = "KAPILDEV@83"

**Output:**     **Number of digits – 2**

**Number of Alphabets – 8**

**Number of Special characters – 1**

### Question 7

[15]

Define a class to accept values into an array of double data type of size 20. Accept a double value from user and search in the array using **linear search** method. If value is found display message "Found" with its position where it is present in the array. Otherwise display message "not found".

### Question 8

[15]

Define a class to accept values in integer array of size 10. Find sum of *one digit* number and sum of *two digit* numbers entered. Display them separately.

**Example: Input:** `a[ ] = {2, 12, 4, 9, 18, 25, 3, 32, 20, 1}`

**Output:** Sum of one digit numbers :  $2 + 4 + 9 + 3 + 1 = 19$

**Sum of two digit numbers :  $12 + 18 + 25 + 32 + 20 = 107$**

# Computer Applications

CISCE

Academic Year: 2023-2024

(English Medium)

Date & Time: 13th March 2024, 11:00 am

Duration: 2h

Marks: 100

1. Answers to this Paper must be written on the paper provided separately.
2. You will not be allowed to write during the first 15 minutes.
3. This time is to be spent reading the question paper.
4. The time given at the head of this Paper is the time allowed for writing the answers.
5. This Paper is divided into two Sections.
6. Attempt all questions from Section A and any four questions from Section B.
7. The intended marks for questions or parts of questions are given in brackets [].

## SECTION-A (40 Marks) (Attempt all questions from this Section.)

**Q1. Choose the correct answers to the questions from the given options. (Do not copy the questions, write the correct answer only.)**

**1.1. Consider the above picture and choose the correct statement from the following:**

1. Polygon is the object and the pictures are classes
2. Both polygon and the pictures are classes
3. Polygon is the class and the pictures are objects
4. Both polygon and the pictures are objects

### **Solution**

Polygon is the class, and the pictures are objects

### **Explanation:**

The class is a polygon, and its types include triangle, parallelogram, and pentagon. As a result, they fall under the Polygon class.

1.2. `int x = 98; char ch = (char)x;` what is the value in `ch`?

1. **b**
2. A
3. B
4. 97

**Solution**

b

**Explanation:**

'A' has an ASCII value of 97; hence, ' B' has an ASCII value of 98.

1.3. The output of the statement `"CONCENTRATION".indexOf('T')` is \_\_\_\_\_.

1. 9
2. 7
3. **6**
4. (-1)

**Solution**

The output of the statement `"CONCENTRATION".indexOf('T')` is **6**.

**Explanation:**

The index position of 'T' in "CONCENTRATION" is 6.

1.4. The access specifier that gives least accessibility is \_\_\_\_\_.

1. Package
2. Public
3. Protected
4. **Private**

**Solution**

The access specifier that gives least accessibility is **private**.

**Explanation:**



The private access specifier restricts access to the class solely, providing the least amount of accessibility.

1.5. The output of the statement "talent". compareTo("genius") is \_\_\_\_\_.

1. 11
2. -11
3. 0
4. 13

**Solution**

The output of the statement "talent". compareTo("genius") is 13.

**Explanation:**

ASCII value of 't' - ASCII value of 'g' = 116 - 103 = 13.

1.6. Which of the following is an escape sequence character in Java?

1. /n
2. \t
3. /t
4. //n

**Solution**

\t

**Explanation:**

Every other option is incorrect.

1.7. If (a>b&&b>c) then largest number is \_\_\_\_\_.

1. b
2. c
3. a
4. Wrong expression

**Solution**

If  $(a > b \ \&\& \ b > c)$  then largest number is **a**.

**Explanation:**

a is greater than b, and b is greater than c, so a is the greatest.

1.8. What is the output of `Math.ceil(5.4) + Math.ceil(4.5)`?

1. 10.0
2. 11.0
3. 12.0
4. 9.0

**Solution**

11.0

**Explanation:**

`Mathi.ceil()` returns the next higher number.  $(6.0 + 5.0)$ .

1.9. What is the method to check whether a character is a letter or digit?

1. `isDigif(char)`
2. `isLetterOrDigit()`
3. `isLetterOrDigit(char)`
4. `isLETTERorDIGIT(char)`

**Solution**

`isLetterOrDigit(char)`

**Explanation:**

`isLetterOrDigit()` determines whether a character is a letter, digit, or none of the above.

1.10. The extension of a Java source code file is \_\_\_\_\_.

1. exe
2. obj
3. jvm

#### 4. java

##### Solution

The extension of a Java source code file is **java**.

##### Explanation:

The source code extension is .java, bytecode extension is .obj.

1.11. The number of bytes occupied by a character array of four rows and three columns is \_\_\_\_\_.

1. 12
2. 24
3. 96
4. 48

##### Solution

The number of bytes occupied by a character array of four rows and three columns is **24**.

##### Explanation:

- The size of the char data type is 2 bytes.
- Thus,  $2 * 4 * 3 = 24$ .

1.12. Which of the following data type cannot be used with switch case construct?

1. int
2. char
3. String
4. Double

##### Solution

Double

##### Explanation:

- The data type double is incompatible with all versions of Java.

- There's a doubt. The string data type is also not usable in Java versions prior to 7.0, but it works in switches from 7.0 and above.

1.13. Which of the following are entry-controlled loops?

1. for
  2. while
  3. do..while
  4. switch
1. Only 1
  2. 1 and 2
  3. 1 and 3
  4. 3 and 4

**Solution**

1 and 2

**Explanation:**

The **for** loop and **while** loop are entry-controlled loops that check the condition before entering the loop body.

1.14. Method which reverses a given number is \_\_\_\_\_:

1. Impure method
2. Pure method
3. Constructor
4. Destructor

**Solution**

Method which reverses a given number is **pure method**:

**Explanation:**

The procedure of reversing a number generates a new number that is the reverse of the original number but does not modify the original number.

1.15. If the name of the class is "Yellow", what can be the possible name for its constructors?

1. yellow

2. YELLOW
3. Yell
4. Yellow

**Solution**

Yellow

**Explanation:**

The constructor will have the same name as the class itself.

1.16. Invoking a method by passing the objects of a class is termed as \_\_\_\_.

1. Call by reference
2. Call by value
3. Call by method
4. Call by constructor

**Solution**

Invoking a method by passing the objects of a class is termed as **Call by reference**.

**Explanation:**

Passing an argument as an object acts as a call by reference since only one copy of the object is shared by both the caller and the called method.

1.17. The correct statement to create an object named mango of class fruit:

1. Fruit Mango = new fruit();
2. fruit mango = new fruit();
3. Mango fruit = new Mango();
4. fruit mango = new mango();

**Solution**

fruit mango = new fruit();

**Explanation:**

The class and object names should be the same, as specified in the query.

**1.18. Assertion (A):** Static method can access static and instance variables.

**Reason (R):** Static variables can be accessed only by static method.

1. Assertion and Reason both are correct.
2. Assertion is true and Reason is false.
3. Assertion is false and Reason is true.
4. Assertion and Reason both are false.

**Solution**

Assertion and Reason both are false.

**Explanation:**

The static method can only access itself, whereas an instance variable can be accessed through a class object. Thus, we can conclude that static methods cannot access instance variables without the assistance of an object.

In contrast, static variables can be immediately accessed by both static and instance methods.

**1.19.** What is the output of the Java code given below?

```
String color [] = {"Blue", "Red", "Violet"}; System.out.println(color[2].length());
```

1. 6
2. 5
3. 3
4. 2

**Solution**

6

**Explanation:**

The array element at index position 2 i.e. color[2] is "Violet" and the number of characters in "Violet" is 6.

**1.20.** Which of the following mathematical methods returns only an integer?

1. Math.ceil(n)

2. Math.sqrt(n)
3. Math.floor(n)
4. Math.round(n)

### Solution

Math.round(n)

### Explanation:

This method rounds up/down a supplied decimal value to a whole number. For example, Math.round(5.5) = 6, but Math.round(5.4) = 5.

Q2.

2.1. Write Java expression for:

$$\frac{a + b}{\sqrt{a^2 + b^2}}$$

### Solution

```
double d = Math.abs(a+b)/(Math.sqrt(a*a+b*b));
```

2.2. Evaluate the expression when x is 4:

```
x += x++ * ++x%2;
```

### Solution

```
x += x++ * ++x%2, x=4
x = x+ (x++ * ++x%2)
4 + (4*6%2)
4 + (4 * 0)
4 + 0 = 4
```

2.3. Rewrite the following do while program segment using for:

```
x = 10; y = 20;
do
{
    x++;
    y++;
}while (x<=20);
System.out.println(x*y);
```

### Solution

```
int x,y;  
for(x=10, y=20; x<=20;x++,y++);  
System.out.println(x*y);
```

2.4. Give the output of the following program segment. How many times is the loop executed?

```
for(x=10;x>20;x++)  
System.out.println(x);  
System.out.println(x*2);
```

### Solution

The for loop will run 0 times as the condition is false, and the loop is entry-controlled.

2.5. What is value of x?

```
String s1= "45.50";String s2="54.50";  
double d1=Double.parseDouble(s1);  
double d2=Double.parseDouble(s2);  
int x=(int)(d1+d2)
```

### Solution

```
double d1=45.50  
double d2=54.40  
int x = (int) (45.5+54.5) = 100  
value of x = 100
```

2.6. Consider the following two-dimensional array and answer the questions given below:

```
int x[ ][ ] = {{4,3,2}, {7,8,2}, {8,3,10}, {1,2,9}};
```

- What is the order of the array?
- What is the value of  $x[0][0] + x[2][2]$ ?

### Solution

- Order of the array  $4 \times 3$ , i.e. 4 rows and 3 columns



b.

`x[0][0] = 4, x[2][2] = 10`

So, the result is 14

2.7. Differentiate between boxing and unboxing.

#### Solution

- **Boxing** is the process of changing a primitive datatype into an object of a corresponding wrapper class, whereas
- **Unpacking** is the process of returning a wrapper class object to its primitive state.

2.8. The following code to compare two strings is compiled, the following syntax error was displayed - incompatible types - int cannot be converted to boolean.

Identify the statement which has the error and write the correct statement. Give the output of the program segment.

```
void calculate()
{
    String a="KING",b="KINGDOM";
    boolean x=a.compareTo(b);
    system.out.println(x);
}
```

#### Solution

-4

#### Reason:

`compareTo()` gives the ASCII difference between the first two dissimilar characters present in the string, but if any one of the strings ends early, then it returns the difference of the length.

2.9. Consider the given program and answer the questions given below:

```

class temp
{
    int a;
    temp()
    {
        a=10
    }
    temp(int z)
    {
        a=z;
    }
    void print()
    {
        System.out.println(a);
    }
    void main()
    {
        temp t = new temp();
        temp x = new temp(30);
        t.print();
        x.print();
    }
}

```

- a. What concept of OOPs is depicted in the above program with two constructors?
- b. What is the output of the method main()?

### Solution

- a. Polymorphism. Having two constructors in a class represents constructor overloading, which is a part of polymorphism.
- b. 10  
30

**2.10.** Primitive data types are built in data types which are a part of the wrapper classes. These wrapper classes are encapsulated in the java.lang package. Non primitive datatypes like Scanner class are a part of the utility package for which an object needs to be created.

- To which package the Character and Boolean classes belong?
- Write the statement to access the Scanner class in the program.

### Solution

- java.lang
- ```
Scanner sc=new Scanner(System.in);
```

### SECTION-B (60 Marks) (Answer any four questions from this Section.)

The answers in this section should consist of the programs in either BlueJ environment or any program environment with Java as the base.

Each program should be written using variable description/mnemonic codes so that the logic of the program is clearly depicted. Flowcharts and algorithms are not required.

**Q3.** DTDC, a courier company, charges for the courier based on the weight of the parcel. Define a class with the following specifications:

|                     |                                                                    |             |
|---------------------|--------------------------------------------------------------------|-------------|
| class name:         | courier                                                            |             |
| Member variables:   | name - name of the customer                                        |             |
|                     | weight - weight of the parcel in kilograms                         |             |
|                     | address - address of the recipient                                 |             |
|                     | bill - amount to be paid                                           |             |
|                     | type - 'D'- domestic, 'I'- international                           |             |
| Member methods:     |                                                                    |             |
| void accept ( )-    | to accept the details using the methods of the Scanner class only. |             |
| void calculate ( )- | to calculate the bill as per the following criteria:               |             |
|                     | Weight in Kgs                                                      | Rate per Kg |
|                     | First 5 Kgs                                                        | Rs.800      |

|               |                                                                                            |        |
|---------------|--------------------------------------------------------------------------------------------|--------|
|               | Next 5 Kgs                                                                                 | Rs.700 |
|               | Above 10 Kgs                                                                               | Rs.500 |
|               | An additional amount of Rs.1500 is charged if the type of the courier is I (International) |        |
| void print )- | To print the details                                                                       |        |
| void main ()- | to create an object of the class and invoke the methods                                    |        |

## Solution

```
import java.util.*;
class DTDC
{
    String name, address;
    double weight, bill;
    char type;
    public void accept()

{
    Scanner sc=new Scanner(System.in);
    System.out.print("Enter the name of the customer:");
    name=sc.nextLine();
    System.out.print("Enter the weight of parcel in kilograms:");
    weight=sc.nextDouble();
    Sytem.out.print("Enter the address of the recipient:");
    address=sc.nextLine();
    System.out.print("Enter the type: D for domestic and I for international:");
    type=(char)sc.next().charAt(0);
}

    public void calculate()
    {
        if(weight>0)
        {
            if(weight<=5)
                bill=800*weight;
            else if(weight<=10)
                bill=5*800+700*(weight-5);
            else
                bill=5*800+5*700+500*(weight-10);
        }
        if(type=='I')
            bill+=1500;
    }
}
```

```

    }
    else
        System.out.println("Invalid weight given");
    }
    public void print()
    {
        System.out.println("Name of the customer:"+name);
        System.out.println("Weight of the parcel:"+weight+"kilograms");
        System.out.println("Address of the recipient:"+address);
        System.out.println("Type of the parcel:"+type);
        System.out.println("Amount to be paid:"+bill);
    }
    public static void main(String arg[])
    {
        DTDC obj=new DTDC();
        obj.accept();
        obj.calculate();
        obj.print();
    }
}

```

### Output:

Enter the name of the customer: Alok Kumar Singh.

Enter the weight of the parcel in kilograms: 55.

Enter the address of the recipient: New Delhi.

Enter the type: D for domestic and I for international: D

Name of the customer: Alok Kumar Singh

Weight of the parcel: 55.0 kilograms

Address of the recipient: New Delhi

Type of the parcel: D

Amount to be paid: 30000.0

Q4. Define a class to overload the method perform as follows:

|                                             |                                                                                                                                |
|---------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
| <b>double perform (double r, double h)</b>  | to calculate and return the value of Curved surface area of cone CSA $\pi r l$<br>$l = \sqrt{r^2 + h^2}$                       |
| <b>void perform (int r, int c)</b>          | Use NESTED FOR LOOP to generate the following format r = 4, c = 5 output -<br>1 2 3 4 5<br>1 2 3 4 5<br>1 2 3 4 5<br>1 2 3 4 5 |
| <b>void perform (int m, int n, char ch)</b> | to print the quotient of the division of m and n if ch is Q else print the remainder of the division of m and n if ch is R     |

### Solution

```
class Overloading
{
    double perform( double r, double h)
    {
        double l=Math.sqrt(r*r+h*h);
        double csa=3.142*r*l;
        return csa;
    }
    void perform(int r, int c)
    {
        for(int i=1;i<=r;i++)
        {
            for(int j=1;j<=c;j++)
                System.out.print(j+" ");
            System.out.println();
        }
    }
    void perform(int m, int n, char ch)
```

```

        {
            if(ch=='Q')
                System.out.println("Quotient="+m/n);
            else if(ch=='R')
                System.out.println("Remainder="+m%n);
            else
                System.out.println("Invalid operation");
        }
    }
}

```

### Output:

1 2 3 4 5

1 2 3 4 5

1 2 3 4 5

1 2 3 4 5

1 2 3 4 5

**Q5.** Define a class to accept a number from user and check if it is an EvenPal number or not. (The number is said to be EvenPal number when number is palindrome number (a number is palindrome if it is equal to its reverse) and sum of its digits is an even number.)

Example: 121 - is a palindrome number

Sum of the digits -  $1 + 2 + 1 = 4$  which is an even number

### Solution

```

import java.util.*;
class EvenPal
{
    public static void main(String arg[])
    {
        Scanner sc=new Scanner(System.in);
        System.out.print("Enter a positive number:");
        int num=Math.abs(sc.nextInt());
        int rev=0,sum=0, temp=num;
        while(temp>0)

```

```

    {
        int r=temp%10;
        temp=temp/10;
        rev=rev*10+r;
        sum+=r;
    }
    if(rev==num&&sum%2==0
    System.out.println("It is an EvenPal
    number"+num);
    else
    System.out.println("It is not an EvenPal
    number");
    }
}

```

### Output:

Enter a positive number: 121

It is an EvenPal number 121

Enter a positive number: 123

It is not an EvenPal number

**Q6.** Define a class to accept values into an integer array of order 4 x 4 and check whether it is a DIAGONAL array or not An array is DIAGONAL if the sum of the left diagonal elements equals the sum of the right diagonal elements. Print the appropriate message.

### Example:

3 4 2 5 Sum of the left diagonal elements =

2 5 2 3 3 + 5 + 2 + 1 = 11

5 3 2 7 Sum of the right diagonal elements =

1 3 7 1 5 + 2 + 3 + 1 = 11

### Solution



```

import java.util.*;
class DiagonalArray
{
    public static void main(String arg[])
    {
        Scanner sc=new Scanner(System.in);
        int mat[][]=new int[4][4];
        int i,j;
        //initializing the array
        System.out.println("Enter the array elements");
        for(i=0;i<4;i++)
        {
            for(j=0;j<4;j++)
                mat[i][j]=sc.nextInt();
        }
        //adding both the diagonal elements
        int ld=0,rd=0;
        for(i=0;i<4;i++)
        {
            for(j=0;j<4;j++)
            {
                if(i==j)
                    ld+=mat[i][j];
                if(i+j==3)
                    rd+=mat[i][j];
            }
        }
        //checking both the sums
        if(ld==rd)
            System.out.println("It is a DIAGONAL array");
        else
            System.out.println("It is not a DIAGONAL array");
    }
}

```

### Output:

Enter the array elements

3 4 2 5

2 5 2 3

5 3 2 7

1 3 7 1

It is a DIAGONAL array

**Q7.** Define a class pin code and store the given pin codes in a single-dimensional array. Sort these pin codes in ascending order using the Selection Sort technique only. Display the sorted array.

110061, 110001, 110029, 110023, 110055, 110006, 110019, 110033

### Solution

```
class SelectionSort
{
    public static void main(String args[])
    {
        int arr[]={110061,110001,110029,110023,110055,110006,110019, 110033};
        int len=arr.length
        //performing selection sort in ascending order
        for(int i=0;i<len-1;i++)
        {
            int pos=i;
            for(int j=i+1;j<len;j++)
            {
                if(arr[pos]>arr[j]) //finding the smallest element
                w.r.t. index pos. i
                pos=j;
            }
            int temp=arr[i]; //swapping using 3rd variable
            arr[i]=arr[pos];
            arr[pos]=temp;
        }
        System.out.println("Array elements after the
        sorting");
        for(int i=0;i<len;i++)
        {
            System.out.print(arr[i]+" ");
        }
    }
}
```

### Output:

Array elements after the sorting

110001 110006 110019 110023 110029 110033 110055 110061

**Q8.** Define a class to accept the gmail id and check for its validity.

A gmail id is valid only if it has:

→ @

→ . (dot)

→ gmail

→ com

Example: icse2024@gmail.com is a valid gmail id.

### Solution

```
import java.util.Scanner;
class EmailCheck
{
    public static void main(String args[])
    {
        Scanner sc=new Scanner(System.in);
        System.out.println("Enter a valid gmail id");
        String mail=sc.next().trim();
        int c1=0,c2=0;
        for(int i=0;i<mail.length();i++)
        {
            char c=mail.charAt(i);
            if(c=='@')
                c1++;
            if(c=='.')
                c2++;
        }
        if(c1==1 && c2==1
    }
    if(c1==1 && c2==1
    {
        int p=mail.indexOf('@');
        int q=mail.indexOf('.');
        String subdomain=mail.substring(p+1,q);
        String domain=mail.substring(q+1);
        if(subdomain.equals("gmail") && domain.
        equals("com"))
        System.out.println(mail+" is valid gmail id");
```

```
        else
            System.out.println(mail+" is an invalid gmail id");
        }
        else
            System.out.println(mail+"is an invalid gmail
            id");
        }
    }
}
```

### Output:

Enter a valid gmail id

icse2024@gmail.com

icse2024@gmail.com is a valid gmail id

Enter a valid gmail id

abc123@gmail.com.net

abc123@gmail.net is an invalid gmail id